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ANNUAL REPORT OF THE SUPERINTENDENT OF GOVERNMENT FARMS, 1874-75—II.

Before proceeding to glance at the remaining pages of Mr. Robertson's Report, we hasten to correct two typographical errors into which we unwittingly fell last month. In the last line of the 2nd column of the first page of our number for June, we announced that Surgeon-Major *King* would be the probable Professor of *Geology* at the Agricultural College. We should have written *Keess* for King, and *Zoology* for Geology. We are very apprehensive however that the new College runs the risk of losing the advantage of numbering Dr. Keess among its Professors. Strange to say, the remuneration offered to Surgeon-Major Keess fell short by one-third of that offered to the other Professors—one of whom is his own Assistant in the Medical College. We understand that Dr. Keess represented the unfitness of this arrangement, but was met with the objection that his work would be exclusively in the Lecture room, whereas those who received the higher remuneration would also be required to give practical instruction in the Laboratory or in the field. Any way no satisfactory conclusion could be arrived at; and we hear that Mr. Karney, Assistant to the Professor of Medicine, will be appointed Professor of Zoology instead of Dr. Keess, unless the Government are pleased to settle the question by offering him a standard of remuneration in keeping with his position in the service and his experience as a Professor. We will now briefly review the remainder of Mr. Robertson's Report.

Crops—Field Experiments.—We regret to find that these were again unsuccessful, having to be abandoned on account of the drought. Thus all the trouble and time, not to mention the money expended on them, were lost. We quite sympathize with Mr. Robertson in his disappointment on this subject for two successive years; but we hope that his field experiments for the year ending March 1876 have been brought to a happier issue. One experiment, as to the depth most suitable for sowing cotton and maize, seems to have been brought to a satisfactory conclusion; and for the information of our readers, we excerpt the account given of it in the Report.

"*Seed sowing.*—The following experiment was made in order to ascertain the most suit-

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able depth at which to sow maize and cotton. Fifty grains of each kind of seed were carefully sown at depths varying from 1 inch to 5 inches. The soil was kept in a moist condition during the time the experiment was proceeding:—

New Orleans Cotton.

When counted.	Sown 1 inch deep.	Sown 2 inches deep.	Sown 3 inches deep.	Sown 4 inches deep.	Sown 5 inches deep.
	Number of plants that appeared above ground.				
1st day	......	......	......	......	......
2nd "	......	......	......	......	......
3rd "	......	......	......	......	......
4th "	......	......	......	......	......
5th "	15	......	......	......	......
6th "	32	8	1	......	......
7th "	33	12	5	......	......
8th "	33	17	8	......	......
9th "	33	17	8	......	......

The seeds sown at 1 inch in depth produced 33 plants, or 66 plants for each 100 seeds, and the whole of these plants had appeared before the close of the seventh day after sowing; the seeds sown at 2 inches gave a return of only 34 plants for each 100 seeds; and the whole of these plants did not appear until the eighth day after sowing. The seeds deposited at 3 inches in depth produced only 16 plants for each 100 seeds, and these were not all above ground until the eighth day. It will be seen that no plants were produced from the seeds sown at 4 inches and at 5 inches.

Maize.

When counted.	Sown 1 inch deep.	Sown 2 inches deep.	Sown 3 inches deep.	Sown 4 inches deep.	Sown 5 inches deep.
	Number of plants that appeared above ground.				
1st day	......	......	......	......	......
2nd "	......	......	......	......	......
3rd "	......	......	......	......	......
4th "	......	......	......	......	......
5th "	10	......	......	......	......
6th "	27	4	......	......	......
7th "	38	6	......	......	......
8th "	39	13	4	......	......
9th "	40	16	9	......	......

The 50 grains of maize sown at 1 inch produced 40 plants. The same quantity of seed sown at 2 inches produced only 16 plants; a similar quantity sown at 3 inches in depth, yielded only 13 plants. It will be observed that the maize plants, like the cotton, appeared much more quickly when the seed was lightly covered by soil.

From these experiments it would appear that shallow-sown seeds of the kinds experimented with not only germinate much more quickly, but produce a great many more plants than seed that is buried more deeply in the soil; but it must not be inferred from this that shallow sowing is more likely to produce good results than deep sowing, for the information above given is only a portion of that the experiment is expected to yield; we have yet to ascertain

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whether the more rapid first growth of the plants produced from shallow-sown grain is supported by an equally-luxuriant root-growth, upon which the ability of the plant to withstand the ill effects of a long drought so greatly depends. I am inclined to think that with such large seeds as maize and cotton, 1 inch is too shallow a depth at which to sow them, and, in practice, I seldom sow these seeds at less than 2 inches in depth; but then this is only upon deeply-cultivated and well-pulverised soil, whereas the soil used in the experiment resembled in its physical condition the soils of the ryot. I believe that the more deeply the seed can be sown in the soil with due regard to its germinative powers the more certainly will the plants produced from it reach maturity; but to ensure the proper germination of deeply-sown seed, it is absolutely necessary that the soil in which it is sown should be in a high state of cultivation in order to admit of rain water filtering freely through it, and in its way carrying down atmospheric air to the buried seed. It must be remembered that germination cannot take place except under the influence of air, heat, and moisture; seed that is too deeply buried in a close badly-cultivated soil will altogether fail to germinate. The experiment, as far as it has proceeded, shows how important it is, in order to secure a uniform growth of young plants, that the seed should be deposited at a uniform depth in the soil. I need scarcely point out how necessary it is, in order to secure the best results at harvest from every individual plant, that we should, as far as possible, bring all the plants in a crop to maturity at one time, which can be secured only by regular sowing. Badly or unevenly sown seed must, as the experiment shows, produce plants of great unevenness in growth, these at harvest will mature at very different times, leaving the farmer no choice but either to wait for the backward plants, and thus lose seed by the shedding of the too ripened grain, or, cut down the whole when the first plants reach maturity, and sacrifice the produce of those not yet matured. I hope in my next report to be able to state the further results of the experiment just noticed."

Mr. Robertson sent home, through Messrs. Walker and Co., some Madras-grown Carolina rice. It was husked here by Messrs. Walker and Co., and was sold in London at 11*s*. 6*d*. per cwt. This price was but little higher than that usually given in London for ordinary Madras rice; and this, as the paddy was very good, quite equal to Carolina paddy which fetches a high price in the English market, was really a disappointment. Mr. Robertson, however, points out that in England the demand for rice is of a widely different character from the demand in this country. There, rice is the luxury of the wealthy—here, it is the staple food of the people. There, the rice is wanted beautifully prepared and of a pearly whiteness—here, the people do not care for regularity of size, nor for whiteness; but they do require the very portion which is stripped off, in order to give the rice the white and polished appearance required in the home market.

We suppose, therefore, that so far as producing for the home market is concerned, the cultivation of Carolina rice will not for the present be sufficiently remunerative; but, on the other hand, as Mr. Robertson points out, its less aquatic habits and superior productiveness should secure its general cultivation for the local market. Surely any thing that will diminish the injurious, unhealthy, and unscientific swamp cultivation should be pressed, again and again, upon the people by a wise and paternal Government.

Wheat.—Although the wheat experiments partially failed owing to the high temperature to which they were exposed, we find that Mr. Robertson hopes by a careful selection of a suitable variety, and by greater care in sowing early, that he will eventually succeed in raising a description of wheat suitable for cultivation on the plains. That this would be a great agro-financial gain, there is no doubt, for we find Mr. Robertson writing that "an average crop of wheat will yield a much larger quantity of human food than an average crop of paddy, while a supply of water that would but just suffice to mature one acre of paddy would be ample to meet the requirements of two or three acres of wheat."

Yellow Cholum.—This valuable crop did very well, and Mr. Robertson again presses

it upon the attention of agriculturists as being a very valuable crop for fodder.

Jute.—Several experiments were made with jute seed procured from Bengal. They all did badly, and it appears likely that the climate of Madras itself is too dry to be suitable for jute—though Mr. Robertson thinks it might perhaps do better in the Northern Districts of the Presidency.

Roselle and Sunn Hemp.—These plants were also the subjects of some experiments which, in the case of the roselle, were very satisfactory. The crop was, we are told, grown principally for the sake of the seed; but in order to ascertain the quality of the fibre, some of the plants were cut down while in flower. The "fibre proved to be long in staple, strong and silky." The experiment with the Sunn Hemp did not turn out so well, though treated just the same as the roselle. From this, Mr. Robertson concludes that, while high cultivation is good for the roselle, it does not suit the hemp, causing it to grow too quickly to admit of the due development of its fibre.

Guinea Grass.—This old friend again claims our attention, and, as usual, it appears to be the joy of Mr. Robertson's heart. We quote his own words:—

"*Guinea Grass*—A plot of land, measuring 4·77 acres, was, on the 28th November last, planted with Guinea grass; the soil was a sandy loam of rather a stiffer character than the prevailing soils of this farm. After three ploughings, the land was manured with 4,000 lbs. of cotton seed, the vitality of which had been previously destroyed; the soil was then raised in parallel ridges about 9 inches in height and 2 feet apart; the plants were put in on these ridges at every 2 feet, care being taken that the lines they formed across the field were at right angles to the lines formed by the ridges, thus affording facilities for the employment of the plough during the growth of the crop, both between the ridges and across them. The plants, with which the ground was planted, were removed from tussacks of this grass growing in another field. A wet day was selected for planting, and nearly every plant took root. The following shows the cost of planting this field:—

	RS.	A.	P.
Ploughing three times and ridging...	7	8	0
Four thousand pounds cotton seed...	40	0	0
Carting and spreading manure ...	2	4	0
Labor in planting	8	5	0
Carting plants to field	1	4	0
Total...	59	5	0
Cost per acre...	12	6	0

The field has since received one hoeing. No irrigation water whatever has been applied to the crop, either at the time of planting or subsequently. The rain-fall, as will be seen by the following, was during the past three months unusually light:—

Month.	Wet Days.	Inches.
November (from 28th)...	1	3·38
December	5	5·11
January	1	0·10
February	...	...
March	1	0·77

The first cutting was obtained in February, and the yield was 3 tons and 56 lbs.; another cutting was obtained in March, which weighed 2 tons and 20 lbs.; and there was at the end of the month another crop of about the same weight ready for cutting. The experiment will be continued over another year, and the further results will be reported.

I have before recommended Guinea grass as being well suited for culture in the plains of this Presidency, and I would again strongly advise its extended cultivation. It will, I think, form an excellent rotation grass for arable land; at present there is in the agriculture of this Presidency no crop equivalent to the fodder and root-crops of other countries, and this want Guinea grass promises to supply. Not only is the plant, from its habit of growth, an entire change for the soil, but the system of cultivation pursued with it admits of the soil being kept in a fine state of tilth; while the blades of the grass form such a dense covering, weeds are most effectually kept in check, especially those that usually appear in the crops more commonly cultivated. Land which was kept clean with difficulty and at a great expense when under ordinary crops, cost very little for weeding when under Guinea grass, this being due to its vigorous growth and to the low and close shade afforded by it, and to the facilities the system of culture affords for keeping down the weeds.

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Guinea grass is well suited as a change-crop for land that has long been cultivated with one kind of crop only, and has become infested by certain kinds of weeds or insects such as that crop encourages.

Guinea grass can be cut over regularly for fodder, or it can be grazed by cattle and sheep; for use in the latter way it is excellent, though in showery weather it is better to utilize it in the former way.

Under the system described, the land on which the crop is growing can be manured at any time, and, of course, the more liberally manure is used the better will be the results."

Manure.—Mr. Robertson's paper on manure is so good, and so worthy of attention, that we should do both him and our readers an injustice did we merely allude to it in our present narrow limits. We purpose, therefore, to publish it at length in our next number.

On the question of sub-soil draining, there has been so much misconception, that we copy Mr. Robertson's observation, *in extenso.*

"My remarks in a former report on sub-soil draining have, in some instances, been misunderstood, evidently from a want of knowledge of what sub-soil draining really means. When making those observations, I thought it unnecessary to describe in detail the way in which pipe-drains act, seeing that so much has been written on the subject. It has been contended by some that, if water is so essential for the proper growth and development of field crops in Southern India, that it will be exceedingly unwise to attempt to lessen the quantity of this element in our soils. It must be remembered that no description of sub-soil drains can remove from a soil the whole of the moisture it contains; there is always even in the most perfectly drained land a considerable quantity of water which no drainage can remove. It has been found again and again that a well-drained soil contains during a drought more moisture than an undrained soil of similar character and composition; there are many reasons why this is so; drainage facilitates the working of a soil by field implements, not only in the greater perfection of the work done, but in affording a longer season in which to do the work under favourable conditions, and as a thoroughly-tilled soil is always well pulverised and therefore more porous, its capabilities to retain water by suspension are greatly increased, as well as its abilities to absorb moisture from the air. A proper seed-bed cannot be obtained in a soil in which there is too much water; for the germination of seed and the healthy growth of plants, atmospheric air must be present in the soil, and this cannot be there in a sufficient quantity when the soil is full of water. Further a water-logged soil is always cold, not only on account of the great reduction of temperature caused by the evaporation of its water, but also because heat cannot penetrate into it. Tropical plants suffer very much when the temperature of the soil on which they are growing becomes too greatly reduced. During the prevalence of the north-east monsoon in this district, when we have had a succession of wet days with a clouded sky, I have frequently observed crops turn sickly and yellow, which previously were very healthy in appearance; and such crops seldom did well after their growth was checked in this way, as they were generally afterwards attacked by the fungoid disease "rust." I have not yet had an opportunity to make any experiments regarding the temperature of the soil at such times, but I believe that the check in growth is due almost entirely to the low temperature of the soil, as the crops growing on the drained land remained green and healthy.

There are, of course, soils that do not require to be artificially drained, being sufficiently well drained naturally; I only advocate the removal by sub-soil drainage, of water the land will not hold in suspension, or the water of springs immediately under cultivated land.

Soils differ greatly in their capacity to hold water in mechanical suspension; thus it has been found that—

100 lbs. of quartz-sand will absorb 25 lbs. of water.

100 lbs. of calcareous sand will absorb 29 lbs. of water.

100 lbs. of loamy soil will absorb 40 lbs. of water.

100 lbs. of English chalk will absorb 45 lbs. of water.

100 lbs. of clay loam will absorb 50 lbs. of water.

100 lbs. of pure clay will absorb 70 lbs. of water.

The pipes used in sub-soil draining should be placed for carrying off surplus water at a depth sufficiently great to allow of the upper soil forming a huge filter bed, to which the rain water in passing through would give up the fertilizing matter and air it holds. Messrs. Laws and Gilbert, the eminent chemists, have found in England that in a rain-fall of thirty inches in one year, the rain-water that fell on an acre of land carried down with it as much as 7 lbs. of ammonia, which is equal to the quantity contained in a dressing of manure frequently thought sufficient for the wants of one crop.

In a hot country such as this, sub-soil ploughing and other deep cultivation are absolutely

necessary in order to secure the full benefits that result from sub-soil draining. A soil that is simply drained, the particles of which are not separated and loosened under the influences of deep cultivation, cannot in a dry season be expected to take up more moisture from the atmosphere than undrained land of the same kind in a similar mechanical state. The absorption of moisture from the air can only occur in porous soils into which the air can pass freely; sun-dried, hard, compact soils are quite incapable of absorbing moisture from the air. As in this country, at night, the air near the surface of the ground is at certain seasons so heavily charged with moisture, it is especially necessary, in order to secure this moisture, that our soils should be kept as open and as porous as possible."

During the year under observation, a cast iron plough, a steel plough, a maize sheller, a winnowing machine, and two chaff cutters were added to the Stock of Implements and machines on the Experimental Farm.

THE MODEL FARM.

The land of this Farm was, as mentioned in former Reports, in a very impoverished and unsatisfactory condition. The soil was poor and the surface very uneven. This of course greatly diminished the earnings of the Farm. However, the land has now been levelled and put into good working condition, and it is to be hoped that the results will soon be more thoroughly satisfactory.

IMPLEMENT WORKSHOPS.

The income of these workshops during the past year amounted to Rupees 2,243-11-9, and the expenditure on their account was Rupees 2,120-12-0. This reduced the balance standing against them from former years to Rupees 424-15-8. During the year under review these workshops turned out 13 combined ploughs, 7 iron ploughs, 3 maize shellers, 1 chaff cutter, 1 drag harrow, and many smaller implements, besides executing all the repairs needed by the Farm implements. The implements turned out by these workshops were sent to Burmah, Cochin, Port Blair, Travancore, North-West Provinces, &c., showing how much such workshops are needed, and giving good hopes of their success in the future.

The reports close with the usual appendices, showing the rain-fall registered at the Experimental Farm, the expenditure on account of the Agricultural Department, the income of the Agricultural Department, a valuation of Live and Dead Stock, a list of seeds supplied gratis, and a Catalogue of Machines, Books, Implements, &c.

On the whole, we consider that, notwithstanding the disappointments which are only due to the condition of things, the general progress of the Government farms is highly satisfactory, and we congratulate Mr. Robertson on the good results that have accrued to the Government and to the country under his skill and experience.

HIGH COURT—ALLAHABAD.

[*Before a Full Bench.*]

TURNER, OFFG. C. J., PEARSON, SPANKIE, AND OLDFIELD, JJ.

Redemption of Mortgage—Limitation—Acknowledgment of Title of Mortgagor or of his right to Redeem—Act IX of 1871, *Sch. II*, 148.

Where the defendants attested as correct the record-of-rights prepared at a settlement with them of an estate in which they were described as mortgagees of the estate, but which did not mention the name of the mortgagor.

HELD, (Spankie, J., dissenting) *that there was an acknowledgment of the mortgagor's right to redeem within the meaning of Article* 148, *Sch. II, Act IX of* 1871.

PER PEARSON, J.—*That there was also an acknowledgment of the mortgagor's title.*

PER SPANKIE, J., *contra.*

Daia Chand and others *v.* Sarfraz and others.*

THE plaintiffs sued to redeem a mortgage of the entire 20 biswas of mauza Pal, pargana Jauli Jansath, zila Saharanpur, alleged to have been made in 1811 for Rupees 241 by their ancestors to the ancestors of the defendants. The latter denied the mortgage, alleging that they were the proprietors of the estate. From the evidence adduced it appeared that in 1863 the plaintiffs applied to the revenue authorities to record their names as the mortgagors of the estate,

* Appeal under Cl. 10 of the Letters Patent, No. 4 of 1875.

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but the application was refused. In May 1872, at the instance of the defendants, the entry of the word "mortgagee" opposite the names of the defendants in the *khewat* annually prepared by the patwari was directed to be discontinued. The first Court, looking at these circumstances, treated the suit as one for the possession of land and dismissed it, holding that it should have been valued at five times the revenue payable to Government in respect of the property in suit, instead of according to the principal amount of the mortgage-money. The Lower Appellate Court held that the suit was correctly valued. It disallowed a plea taken by the defendants to the effect that the suit was barred by the law of limitation, as it appeared that the defendant's ancestors had signed the *khewat* and the *khatauni shara asamiwar* prepared at the settlement of the estate with them under Regulation IX of 1833 in 1841, in which they were described as mortgagees, which it held amounted to an acknowledgment of the plaintiffs' title as mortgagors, and remanded the suit to the first Court for disposal on the merits.

The *khewat* of 1841 made no mention of the nature of the mortgage and none of the mortgagors. The parties who signed it were described as holding certain shares and as mortgagees. There was no record of the names of the owners of the shares. The *khatauni shara asamiwar* showed the rates of rent payable by tenants. The parties who signed that paper were also described as mortgagees. There was a note by the officer making the settlement that "the parties in possession are mortgagees, but the amount of the mortgage and its duration are unknown: it occurred before British occupation." The parties did not, in affixing their signatures to either document, add the word "mortgagees." The *khewat* was not confined to a record of the distribution of the shares and the interest of the parties as mortgagees. It contained the *ikrar-nama*, or *wajib-ul-arz*, being a record of agreement between the coparceners amongst themselves, on various matters, and a detail of customs, &c., prevailing in the estate. The signatures were affixed at the foot of the document. The Tahsildar recorded that, after all the particulars of the *ikrar-nama* and the amount of rupees had been read out to the parties, they affixed their signatures and marks with their own hands. Similarly with the *khatauni shara asamiwar*, the Tahsildar recorded that the parties, after hearing the rates of rent, had affixed their signatures and marks, and verified all the particulars entered in the document.

On special appeal to the High Court from the order remanding the case the defendants contended that the signatures of their ancestors to the documents did not amount to an acknowledgment of the plaintiffs' title as mortgagors or of their right to redeem, within the meaning of Act IX of 1871, Sch. II, 148. They also contended, with reference to an order passed in the settlement department in January 1864, which refused an application by the plaintiffs for the entry of their names in respect of certain unculturable lands and trees in the village and referred them to a Civil Court, that the suit was barred by limitation, not having been instituted within three years from the date of that order.

The learned Judges of the Division Court (Pearson and Spankie, JJ.) before which the appeal came on for hearing differed in opinion.

The following judgments were delivered:—

PEARSON, J.—This is a suit for the redemption of a mortgage said to have been made in favour of the defendants' ancestors by the ancestors of the plaintiffs in 1811, and was dismissed by the Court of first instance improperly on the ground of insufficient valuation. The Lower Appellate Court has rightly held the valuation to be correct, and, disallowing a plea set up by the defendants to the effect that the suit was barred by the law of limitation, has remanded the case to the first Court under Section 351, Act VIII of 1859, for trial and disposal on the merits. The plea of limitation has been disallowed with reference to an acknowledgment of their mortgage tenure recorded in the settlement record of 1841, which is signed by the defendants or their forefathers. In that record they described themselves, or allowed themselves to be described, as mortgagees of the estate in question; and by so doing admitted by implication the title of the mortgagors, whoever they may be, and their right to redeem the property. Whether the plaintiffs' ancestors were the mortgagors, and whether the mortgage was made by them in 1811 for a consideration of Rupees 241, are questions which must be determined before it can be decided whether the suit can be maintained. Even if it be established that the plaintiffs' ancestors were the mortgagors, unless it be shown that the mortgage was not made before 1811, it may be found that the suit is barred by limitation. But although the Subordinate Judge's decision is open to this objection, that he has somewhat precipitately declared the suit not to be barred by limitation, while not quite consistently remarking that, "if the plaintiffs can prove the mortgage to have been effected by their ancestors in favour of those of the defendants in 1811, they will obtain a decree, if not, their claim must be rejected," there is nothing objectionable in his remand order on the assumption that the materials on the record were not sufficient to enable him to decide satisfactorily himself. There is no force in the grounds of appeal. Nothing is shown to be a bar of the suit in the proceedings of 1864, which referred to a claim of

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certain manorial rights only. The admission of the mortgage tenure in the settlement record of 1841, if it can be referred to the plaintiffs' ancestors, and the mortgage be found to have been made by them in 1811, is sufficient to give a new period of limitation from the date of the admission. With these remarks, the appeal is dismissed with costs.

SPANKIE, J.—Article 148, Sch. II, Act IX of 1871, provides that time shall run from the date of the mortgage, unless when an acknowyment of the title of the mortgagor or of his right of redemption has, before the expiration of the prescribed period, been made in writing, signed by the mortgagee or some person claiming under him and, in such case, the date of the acknowledgment.

It is argued in this case that some of the ancestors of the defendants, appellants, attested as correct the *khewat* and *khatauni shara asamiwar* prepared at the settlement under Regulation IX of 1833 in 1841, in which they are described as mortgagees. Their signatures, it was contended, are an acknowledgment of the mortgage tenure, and take the case out of the operation of the limitation law. (The learned Judge, after stating the facts relating to the *khewat* and the *khatauni shara asamiwar*, continued):—It will be seen from what I have stated that the parties who signed have not acknowledged any particular fact, but their signatures must be taken as an admission of the general accuracy of the *khewat* and *khatauni*, the one containing a variety of matter, the other having the special object of showing the rent payable to the landlords by their tenants.

I may also mention that there did not appear to be any recognized owners in 1841, the entire 20 biswas being in the possession of persons described as mortgagees. I attribute this description to be due to some report regarding an earlier settlement and the state of the village then, obtained from the office when the settlement under Regulation IX of 1833 was made.

I do not regard the signatures of the ancestors of the defendants, under the circumstances described, as amounting to an acknowledgment of the title of the mortgagor or of his right of redemption, within the meaning of Article 148, Sch. II, Act IX of 1871. The record shows that the appellants did not acknowledge any right of redemption anywhere. They contested in 1863 an attempt of the heirs of the mortgagors to establish their right of redemption, and ultimately in 1872 they succeeded in obtaining an order from the revenue authorities for the erasure of the word mortgagees.

If we look at the effect of an acknowledgment in writing in respect of a debt or legacy (Sec. 20, Act IX of 1871), we find that no promise or undertaking would take the case out of the operation of the Act, unless the promise or acknowledgment amounts to an express undertaking to pay or deliver the debt or legacy, or to an unqualified admission of the liability as subsisting. So I think that any one who desires to take his claim out of the operation of Article 148, Sch. II., must show a clear and express acknowledgment in writing of the title of the mortgagor or of his right to redeem, that this acknowledgment must be unqualified and made touching the mortgage. It cannot be implied from a general admission of the accuracy of certain settlement records dealing with a great variety of matters.

I, therefore, would decree the appeal, reverse the judgment of the Lower Appellate Court and restore that of the first Court, with costs.

The defendants appealed to the Full Court, under the provisions of Clause 10 of the Letters Patent, against the judgment of Pearson, J.

Munshi *Hanuman Parshad* (with him Babu *Jogindro Nath Chaudhari*), for the appellants, contended that the mere signatures of the mortgagees to a document, in which they were described as mortgagees, and which did not show who the mortgagor was, or the nature of the mortgage, or the amount of the mortgage-money, did not amount to an acknowledgment of the title of the mortgagor or of his right to redeem. There is no written acknowledgment touching the mortgage, signed by the mortgagees, which expressly, or by implication, acknowledges the title of the mortgagor or of his right to redeem. The entry in the documents was made by the settlement officer.

Pandit *Bishambar Nath* for the respondents. —The mortgagees were in possession of the property. They assigned to themselves at the settlement of the estate the position of mortgagees. The entries were made on their representation, and are signed by them. The statements recorded are accepted by them. This amounts to an acknowledgment of the title of the mortgagor, whoever he may be.

TURNER, OFFG. C. J., and OLDFIELD, J., concurred in the following opinion :—

The question which arises in this appeal is whether or not there has been a sufficient acknowledgment of the mortgagor's title or his right to redeem to prevent the operation of the law of limitation, or rather to give the representatives of the mortgagors a new period from which limitation should be computed.

The terms of the law, an acknowledgment of the mortgagor's title or an acknowledgment of his right to redeem, were not, it may be presumed, intended to be mere tautology. An

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acknowledgment that a certain person, or his representative, is the proprietor of the estate is an acknowledgment of his title. An acknowledgment that the mortgage is a subsisting mortgage would be an acknowledgment of his right to redeem, if he established his title.

The provisions of the English Statute 3 and 4 Will. 4, Cap. 27, Section 28, require, in order to enlarge the statutary period of limitation, that an acknowledgment of the title of the mortgagor or of his right to redemption shall be given to the mortgagor or some person claiming his estate, or to the agent of such mortgagor or person, in writing signed by the mortgagee or the person claiming. It appears to be the law that any acknowledgment, which before the passing of the English Statute would have been sufficient, will satisfy the requirements of the Statute if it be given in writing to the mortgagor or to a person claiming his estate, or to the agent of such mortgagor or person.—Fisher on Mortgages, 2nd Ed. Vol. I, 502, page 288. Before the Statute was enacted it was held that an acknowledgment of the mortgage as a subsisting mortgage was an acknowledgment of the mortgagor's right to redeem: and in a case quoted by Lord Hardwicke it was held by Sir J. Jekyll that, where a testator described an estate in his will as my "mortgaged estate," it was a sufficient acknowledgment of the mortgagor's right to redeem.* This ruling appears never to have been over-ruled: it is quoted in Tudor's Leading Cases, Vol. II, 4th Ed., 1065. We are not, indeed, bound by English cases, but we may usefully consult them.

With the exception that it requires the acknowledgment to be in writing, the law of limitation in this country, so far as it applies to the question before us, appears to be analogous to the English law as it was established by the practice of the Courts of Equity before the Statute above referred to was enacted. The law of British India does not require that the acknowledgment should be given to the mortgagor, but, in other respects, it follows the language of the English Statute and the practice of the Courts of Equity before that Statute was enacted. The acknowledgment must be in writing, signed by the mortgagee or a person claiming under him, and it must acknowledge the title of the mortgagor or his right to redeem. In the case before us the settlement officer had prepared the record-of-rights, a record which by law he was bound to prepare, showing the interests in the village of which he found persons in possession. From the records of preceding settlements he ascertained that the appellants, or rather their predecessors in title, had obtained possession in virtue of a mortgage, and he entered them accordingly in his record as mortgagees. To this record, for the purpose of certifying to its correctness, he obtained the signature of those whom he found in possession, and, amongst others, of the appellants. This appears to be a stronger case than that decided by Sir J. Jekyll. Here there is not a mere description of the estate as a mortgaged estate, but a subscription to a record purporting to show the extent of the rights which the persons in possession enjoyed. For this reason we hold the acknowledgment sufficient, and would dismiss the appeal with costs.

* 3 Atkyns' Rep., at p. 111.

Pearson, J.—There can be no doubt that the settlement record of 1841 does not contain an express acknowledgment of the title of any particular persons as owners of the estate in question in this suit or of their right of redemption, for the mortgagors or their representatives are not named. If, therefore, such an express acknowledgment be required by the terms of Article 148, Sch. II, Act IX of 1871, the present suit, instituted in 1874 for the redemption of a mortgage alleged to have been made in 1811, is liable to be dismissed as barred by the law of limitation. I still adhere to the opinion intimated in my judgment of the 8th April last, that such an express acknowledgment is not required, and the acknowledgment of a subsisting mortgage tenure is by implication an acknowledgment of the title of an owner and of his right to redeem, and sufficiently for all practical purposes complies with the terms of the law. It is not reasonable to suppose that any one would allow himself to be described as the mortgagee of a property of which the mortgage had ceased to be redeemable at law, and the names of the owners thereof had been lost to knowledge by lapse of time, without any mention of those circumstances. In the present case there are no grounds for supposing that in 1841 there was any doubt or dispute as to who were the owners, or whether they were entitled to redeem the property in suit. The addition of their names, though it would have completed the statement of the facts, was hardly necessary, and the omission of their names was presumably accidental. An acknowledgment of a mortgage tenure not including the title of a mortgagor and of a right to redeem appears to be meaningless, useless, and absurd. The main point is whether the tenure is that of a mortgagee; it can make no difference to the mortgagee whether the owner is A or B. If it be held that an entry describing C as mortgagee of a share, acknowledged by C, would be an acknowledgment that would satisfy the requirements of the law, it cannot plausibly be contended that an entry describing C as a mortgagee does not describe a subsisting mortgage tenure. But if there were any real doubt as to whether the acknowledgment implied in a man's description of himself as a mortgagee

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referred to a subsisting mortgage, or one which had ceased to be redeemable, the doubt might easily be removed by an enquiry as to whether the mortgage had or had not ceased to be redeemable at law at the date of the acknowledgment.

The view which I have taken as to what constitutes a sufficient acknowledgment is apparently not at variance with English law. In page 288, Vol. I, Fisher's Law of Mortgage, it is stated that "any expression referring to the estate as mortgaged will be a sufficient acknowledgment." The description by a man of himself as the mortgagee of an estate is surely a reference to the estate as mortgaged to him. In the case of *Stansfield* v. *Hobson*,* cited in support of the doctrine, the reference to the estate, as one of which the mortgage was redeemable, did not express the name of the party entitled to redeem, which was ascertained by external evidence. This case establishes both the points for which I contend; first, that an acknowledgment of a mortgage tenure is by implication an acknowledgment of the title of an owner; and secondly, that other evidence may be admitted to show who is the person possessing that title to whom the acknowledgment referred. In that case the evidence indicating the owner may have been nearer at hand than in the present case; but that difference does not affect the principle that an acknowledgment of a redeemable mortgage may be connected by evidence with the person entitled to redeem it. On the other hand, it is observable that the acknowledgment in that case not only did not specify any particular person as the owner, but that it did not specify any particular property as the subject of the mortgage; and further, that it was apparently made after the lapse of the period of the limitation, when the right of redemption, if it had not been extinguished, could not be enforced at law. The acknowledgment, indeed, which was deemed sufficient to take the case out of the ordinary operation of the law of limitation was no more than an answer by the mortgagee to a proposal on behalf of the mortgagor for a meeting for the purpose of considering the matter of the debt, to the effect that, unless some one was prepared to pay the debt, a meeting would be useless. It was held that, by that answer, a right of redemption had been admitted; and the admission was supplemented by evidence which pointed out the mortgagor and the mortgaged property. In the present case the acknowledgment takes the form of a description by the defendants' ancestors of themselves as mortgagees of the property in question on the public and solemn occasion of a settlement, the mortgage not being known to have been irredeemable at law at the time, and a clue to the names of the owners being found in the settlement records.

* 3 De G. Mac. and G. 620; S. C. 16 Beav. 236; 22 L. J. Chanc. 657.

At page 314 of Atkyn's Reports mention is made of a case in which Sir J. Jekyll decreed a redemption upon the circumstance of the person who was in possession of an estate originally in mortgage calling it by the name of the mortgaged estate in his will. This case supports my judgment not less than that of *Stansfield* v. *Hobson* above quoted.

SPANKIE, J.—I am under the impression that my honorable colleagues take a different view of this case than I do. I, therefore, would simply say that I adhere to my former judgment. Nothing was stated at the hearing which shows me that my opinion was wrong, and I can add nothing to what I have already put on record.—*The Indian Law Reports*, Vol. I, Part IV, Page 117.

CIRCULAR ORDERS OF THE BOARD OF REVENUE.

No. V.

STANDING No. 404-16.

LEAVE ON HALF-PAY TO SICK PEONS.

Proceedings of the Board of Revenue, dated 16th May 1876, *No.* 1,268.

G. O., dated 21st March 1876, No. 397.

IN substitution of Standing Circular No. 404-1 (5 of 1866) the following amended rule has been sanctioned.

2. The indulgence of leave on half-pay is to be restricted to peons receiving medical aid from a hospital or dispensary as in or out-door patients, except where there is no hospital or dispensary at the station at which the peon is serving, the indulgence being granted in such cases at the discretion of the divisional officer to peons during such leave at their homes.

No. VI.

STANDING No. 171-7.

VILLAGE SERVICE INAMS ENFRANCHISED.

Proceedings of the Board of Revenue, dated 19th May 1876, *No.* 1,304.

G. O., dated 31st March 1876, No. 453.

IN modification of Standing Circular No. 171-3 (14 of 1870), Government have decided that the *full* assessment *minus* the old jodi on Enfranchised Village Service Inams, reverting to Government by escheat or relinquishment, should be credited to the Village Service Fund.

No. VII.

STANDING Nos. 150-12 and 144-2.

SUB-DIVISION OF SURVEY FIELDS.

Proceedings of the Board of Revenue, dated 24th May 1876, *No.* 1,368.

IN modification of Standing Circular No. 7 of 1875, it has been decided that stone demarcation is to be reserved for survey fields, and that the sub-division of survey fields shall be marked by means of field banks instead of by stones not bearing the distinctive marks of the Survey Department.

G. O., dated 11th March 1876, No. 360.

2. The following course should be pursued in recording measurements of sub-divisions of survey fields :—

In districts that have been surveyed or settled, a record of all measurements of sub-divisions of survey fields made subsequently by the Revenue Department must be prepared in duplicate, and one copy should be filed in the Collector's Office, and the other furnished to the Curnam. A separate register for each taluk should be kept in the Collector's Office in which all sub-divisions, as submitted for confirmation, should be recorded, and, at the same time, the measurement sketched should be numbered to conform with the register and one copy filed as above directed.

In districts that have not been surveyed or settled, it will suffice if the Curnam's measurement sketch be filed in the taluk with the order sanctioning the sub-division.

No. VIII.

STANDING No. 407-14.

TRAVELLING ALLOWANCE TO HOSPITAL ASSISTANTS PROCEEDING ON DUTY IN CIVIL DEPARTMENT BY RAIL.

Proceedings of the Board of Revenue, dated 30th May 1876, *No.* 1,412.

COLLECTORS are informed that the Standing Order No. 407-12 is intended to apply to journeys performed by Hospital Assistants travelling from one station to another in joining appointments but not to journeys performed on duty within the district. Hospital Assistants travelling by rail within the district on duty other than that indicated above can only draw a single fare of the class to which their rank entitles them under Standing Order No. 407, paragraph 2, page 420 of Mr. Dalyell's edition.

HER MAJESTY'S PRIVY COUNCIL.

[BENGAL CASE.]

Act VIII of 1859, *Section* 2—*Cause of Action*—Res judicata.

B, as adopted son and heir of G, instituted a suit to set aside certain putni leases, under which certain persons claimed to hold lands which had belonged to G. The defence was, that B was not the legally adopted son of G, and an issue on this point having been settled, K, who claimed to be the reversionary heir of G, was made a defendant under Section 73 *of Act VIII of* 1859; *and it was eventually decided in that suit that B was the duly adopted son of G.*

HELD, *that a subsequent suit by K against B to set aside the adoption could not, on the principles laid down in the case of* Soorjeemonee Dayee *v.* Suddanund Mohapatter,* *be maintained.*

Kriparam *v.* Bhagawan Das† *overruled.*

Judgment of the Lords of the Judicial Committee of the Privy Council on the appeal of *Krishna Behari Roy* v. *Bunwari Lall Roy* and another, from the High Court of Judicature at Fort William in Bengal, delivered 17th November 1875.

Present.

SIR JAMES W. COLVILE.
SIR BARNES PEACOCK.
SIR MONTAGUE E. SMITH.
SIR ROBERT P. COLLIER.

Mr. *L. W. Cave*, Q.C., and Mr. *Horace Smith*, for the appellant.

Mr. *Leith*, Q. C., and Mr. *Doyne*, for the respondents.

The facts of the case and the arguments are sufficiently stated in the judgment of their lordships, which was delivered by

Sir M. E. SMITH.—This was a suit brought by the appellant, claiming to be the heir of Goursoonder Roy, to set aside an adoption of the respondent Bunwari Lall, alleged to have been made by the widow of Goursoonder Roy. One of the defences set up by Bunwari Lall and by his mother, who was joined in the suit as a defendant, was that the question of the validity of the adoption of Bunwari Lall had been already decided in a former suit, to which

* 12 B. L. R., 304. † 1 B. L. R., A. C., 68.

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the present appellant Krishna Behari Roy was a party. An issue was raised upon that defence. Now it appears that a former suit had occurred which was of this nature; Bunwari Lall had brought an action against some patnidars who claimed under patni leases granted by his adoptive mother. The ground on which he sought to set aside the leases was, that she had exceeded her power in granting them, inasmuch as she had only a widow's estate. It is not necessary to state more respecting the object of that suit. An issue was raised in it upon the question whether Bunwari Lall had been validly adopted. The present appellant and plaintiff Krishna Behari Roy intervened in that suit, upon the ground that he was the heir of Goursoonder Roy, and, as the heir, had a right to intervene to dispute the title of Bunwari Lall as his adopted son. It does not appear very clearly at what period of the suit that issue was raised—whether before or after Krishna Behari Roy intervened—but undoubtedly it was raised, and is in substance the same as the issue raised in the present suit. The issue was tried, and the Principal Sudr Ameen found against the intervenor and in favour of the adoption. He also found in favor of the patnidar that the patni could not be set aside. The patnidar having a decision in his favor, was, of course, satisfied with that decree; but Krishna Behari Roy being dissatisfied with the finding upon the issue as to the adoption, appealed to the Civil Judge. On this appeal the decision of the Principal Sudr Ameen was affirmed. Again he appealed from the Civil Judge to the High Court, which, after fully hearing the case upon the issue of adoption, affirmed the decisions of the Courts below. There exists, therefore, a final and complete judgment upon the issue raised either at the instance of Krishna Behari Roy, or which he adopted, on the very question which he seeks again to raise in this suit.

Both the Courts below have held that the present suit is barred by reason of the judgment in the former one. The ground of the present appeal is that they are wrong, inasmuch as it is said, that the case does not come within Section 2 of Act VIII of 1859. Now the section is this:—"The Civil Courts shall not take cognizance of any suit brought on a cause of action which shall have been heard and determined by a Court of competent jurisdiction in a former suit between the same parties or between parties under whom they claim." Their lordships are of opinion that the expression "cause of action" cannot be taken in its literal and most restricted sense. But however that may be, by the general law, where a material issue has been tried and determined between the same parties in a proper suit, and in a competent Court, as to the status of one of them in relation to the other, it cannot, in their opinion, be again tried in another suit between them.

It is not necessary for their lordships to go at length into the reasons for their decision, because those reasons appear in a recent judgment of this Board in the case of *Soorjeemonee Dayee* v. *Suddanund Mohapatter*.* In that judgment it is said, after reference to the second clause of Act VIII, "Their lordships are of opinion that the term 'cause of action' is to be construed with reference rather to the substance than to the form of action, and they are of opinion that in this case the cause of action was in substance to declare the will invalid, on the ground of the want of power of the testator to devise the property he dealt with. But even if this interpretation were not correct, their lordships are of opinion that this clause in the Code of Procedure would by no means prevent the operation of the general law relating to *res judicata*, founded on the principle '*nemo debt bis vexari pro eâdem causâ*.' This law has been laid down by a series of cases in this country with which the profession is familiar. It has probably never been better laid down than in a case which was referred of *Gregory* v. *Molesworth*,† in which Lord Hardwicke held that where a question was necessarily decided in effect, though not in express terms, between parties to the suit, they could not raise the same question as between themselves in any other suit in any other form; and that decision has been followed by a long course of decisions, the greater part of which will be found noticed in the very able notes of Mr. Smith to the case of the *Duchess of Kingston*."‡

A decision of the High Court of Bengal has been referred to, the case of *Kriparam* v. *Bhagawan Das*,§ as having a contrary tendency. All their lordships desire to say of it is that, as reported, it does not appear to be consistent with their judgment in the former appeal to which they have referred, nor with their opinion in the present case. The decision is of so recent a date that they desire to say no more upon it.

On reference to some notes of Mr. Broughton on this section of Act VIII of 1859, it appears that the decisions have not been uniform in the Courts in India. Several of them are opposed to that referred to.

It was suggested by Mr. Cave that the former judgment ought not to be binding, because certain witnesses having been examined before the present appellant intervened in the suit, he was refused the opportunity of cross-examining them. Their lordships think that

* 12 B. L. R., 304. † 3 Atkyns, 626.

‡ 2 Smith's L. C., 6th ed., 679.

§ 1 B. L. R., A. C., 68. In their lordships' printed judgment the case referred to is incorrectly given as *Shaikh Rahmatulla* v. *Shaikh Sariutulla Kagchi*.

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such an objection is no answer to the defence arising from the former judgment. If there had been any miscarriage of that kind, the matter was one for appeal in that suit. The objection does not appear to have been raised in the appeals which were successively made in that suit to the Civil Judge and to the High Court; but whether it was so raised or not, their lordships think that they cannot affect the operation of the final judgment, which must be taken to have been rightly given.

In the result, their lordships will humbly advise Her Majesty to dismiss this appeal, and to affirm the judgments below with costs.—*The Indian Law Reports*, Vol. I, Part IV, page 144.

OFFICIAL PAPERS.

FOOT-AND-MOUTH DISEASE IN CATTLE.

Proceedings of the Madras Government, Revenue Department, 3rd May 1876.

Read the following letter from C. MACAULAY, Esq., Officiating Under Secretary to the Government of India, Department of Revenue, Agriculture, and Commerce (Studs, Cattle-disease, &c.), to the Secretary to the Government of Madras, dated Calcutta, 17th April 1876, No. 3-43:—

IN continuation of the circular from this department, No. 2, dated the 14th February last, I am directed to forward, for the information of His Grace the Governor in Council, copy of a letter* from the Junior Secretary to the Chief Commissioner of Oudh, and of its enclosure, a report by Mr. Anderson, Veterinary Surgeon, on special duty in that province, on the subject of the trial of Colonel Davies' prescription for the treatment of foot-and-mouth disease in cattle and on the general features of that disease as it occurs in Oudh.

* No. 1375, dated the 25th March 1876.

ENCLOSURE No. 1.

From A. MURRAY, Esq., Junior Secretary to the Chief Commissioner of Oudh, to the Secretary to the Government of India, dated Lucknow, 25th March 1876, No. 1,375.

With reference to your letter, No. 2-22, dated 14th February last, forwarding copy of despatch from the Secretary of State for India, enclosing a correspondence with the Veterinary Department of the Privy Council, regarding Colonel Davies' mode of treatment of foot-and-mouth disease in cattle, I am directed to forward, for the information of His Excellency the Governor-General in Council, the accompanying copy of a letter* from Mr. Anderson, Veterinary Surgeon, on special duty in Oudh, and of its enclosure, on the result of the trial of Colonel Davies' prescription and on the treatment of cattle-disease generally.

* No. 113, dated 14th March 1876.

From Mr. T. ANDERSON, Veterinary Surgeon on special duty in Oudh, to the Junior Secretary to the Chief Commissioner of Oudh, dated 14th March 1876, No. 113.

In compliance with your letter, No. 4,914, dated 21st October 1875, I have the honor to state that I have had Colonel Davies' prescriptions fully tried in the Oudh Province.

2. Before discussing the results I beg to submit a few remarks on the disease itself, which may somewhat elucidate the subject in question.

3. If Colonel Davies' prescription for the foot-and-mouth disease in Burma be correct, it is one of an entirely different nature from that designated by the same name in India, in England, and on the Continent, and no inference of any value can be drawn from a trial of his remedies in cases attacked by the ordinary disease.

4. With regard to the parasitic animalculæ "which," Colonel Davies states, "cause the disease," and whose destruction is the aim of his treatment, I beg to make the following extract from Professor Williams' Principles and Practice of Veterinary Medicines (page 157), a work which is the latest and most reliable authority on diseases of domesticated animals. "Some," he observes, "have thought that the contagium was contained or existed in the form of a vegetable parasite fungus, whilst others, speculating as to its source of origin, have advanced the idea that it is due to the development of organic germs having independent movements, in fact, to living particles of animal matter. These are, however, speculations which cannot be confirmed by examination with high microscopic powers; they therefore fall to the ground. Microscopic examination of the blood, saliva, tears, and the contents of the vesicles, have failed to detect any substance to the presence of which the disease might be ascribed."

5. Foot-and-mouth disease is simply "a highly contagious and infectious febrile disease associated with a vesicular eruption in the mouth, between the pedal digits and around the coronets" (Williams); and, being so, it must run its course, while the most successful treat-

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ment will be one which will best alleviate the symptoms and best preserve the patient under healthy sanitary conditions. In hot climates where wounds and sores have a tendency to take an unhealthy action, thereby attracting the attacks of flies, it is a point of the utmost importance, in cases of this disease, to prevent the sores from becoming fly-blown, which they are most apt to do. In fact, the rapid generation of maggots in the wounds associated with this disease is the chief difference exhibited between it as it occurs in India and in England, and possibly their very frequent occurrence in these sores may have led Colonel Davies to attribute the cause of the disease to their presence.

6. During my experience of many hundreds of cases I have found that the disease has been one of a decidedly benign type, and the mortality not exceeding one or two per cent; the loss to the stock-owner being one resulting from his animals getting into low condition, and remaining unfit for work for a considerable time after the attack. When this occurs at seasons of the year when a few days are of the utmost moment regarding the ploughing and tillage of the land previous to sowing, this loss is doubly heavy, first to the Assamee himself, and secondly to Government in the matter of assessment. On this account I beg most respectfully to urge the advisability of special legislation for preventing infected animals from being permitted to go from place to place, thereby spreading the disease, which is one of a most infectious nature.

7. Having submitted these remarks, I beg to state that the following has been the result of a trial of Colonel Davies' prescriptions in about 100 cases. The prescriptions appear to have no specific value, but are beneficial on account of their stimulating and astringent properties. They however rapidly dry and fail to preserve the wounds from the attacks of flies. On this account their action is much inferior to the prescription noted in the appended report on the disease, *viz.*, camphorated oil. This application retains its properties for a much longer period than the others, which is a matter of the utmost importance in a district of wide extent containing hundreds of cases, each one of which cannot be dressed by the few veterinary attendants in charge oftener than once in every two or three days, the Assamees being too apathetic, ignorant, and suspicious to be trusted with treating the cases themselves.

8. I beg to append a few remarks on the nature, symptoms, and treatment of foot-and-mouth disease as it occurs in the province of Oudh, in order to facilitate comparison between it and the disease described by Colonel Davies.

Foot-and-mouth disease.

Definitions.

A febrile disease of a highly contagious and infectious nature, associated with a vesicular eruption about the lips, the inside of the mouth, on the tongue, gums and cheeks, and sometimes extending to the nose. It also occurs between the pedal digits, and at the junction of hair and hoof around the coronets and heels. In some animals the mouth only is affected, in others the feet are the seat of disease, the latter phase being most common in Oudh; in such cases sometimes only one foot is affected and sometimes all four, and in very bad attacks there is separation of the hoof from the feet.

The ravages of this disease are most extensive amongst the working bullocks, they being particularly exposed to the contagium which is contained in the discharge from the feet or mouth as the case may be, and thus impregnates roads, pastures, watering places, and, in fact, every place to which they may go. It is of such an infectious nature that it is easily conveyed from place to place by game, vermin, and dogs.

Symptoms.

The disease is generally ushered in with a shivering fit, followed by fever, loss of appetite, disinclination to move, stiffness and swelling of the legs; and in four or five days vesicles make their appearance, varying in size from a two-anna bit to a rupee, and if the mouth is the seat of disease, saliva flows freely. There is smacking of the lips, and, if the feet are affected, there is lameness and a peculiar action of the affected limbs, which the animal frequently and suddenly picks up and lashes to the rear, a quivering motion being given to it on the completion of the kick, while the limb is held out in a state of tension. When the vesicles burst, sores are left that either heal up immediately or turn into ulcers, which, if neglected, spread, abscesses form, maggots are generated, and in very exceptional cases death is the result.

I have seen sloughing of the hoofs and bones of the foot, and in one case that of the nostrils and cheeks with disease of the bones of the head, the sinuses being infested with maggots extending to the brain.

Treatment.

The treatment should be alleviative, the disease being one that runs through a regular course generally terminating in recovery. Mild cases require little or no treatment whatever save cleanliness: however, when it is practicable the following drench—

Common salt	...	4 to 8 ounces
Chiretta ...	...	1 to 2 „
Ginger ...	...	1 to 2 „
Water ...	...	1 to 2 quarts

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should be divided into two portions, one to be given in the morning and one in the evening. If it be not convenient to administer the drench twice a-day, the whole quantity may be given at one time. If purging ensues, the salt should be discontinued and may be resumed as the state of the bowels may indicate. When the mouth is affected, it should be washed as often as possible with alum water. When sinuses form, they must be well opened up in order to prevent matter burrowing into the sensitive parts of the foot, all detached pieces of skin and horn must be removed with a sharp knife or scissors, and the sores washed and cleaned thoroughly. Maggots are invariably present in bad cases, and until they are removed healthy action cannot set in. This operation is best done by a probe, knife, or forceps, then a pledget or two well soaked in camphorated oil made as follows—

Camphor	... ...	4 parts
Oil of turpentine	... ...	1 „
Linseed oil ...	... ...	16 „

(to be well mixed together)

should, *if* possible, be applied and kept on by means of a bandage. When this cannot be done, the sore and all round it should be smeared with the oil. Two or three such dressings I find sufficient to render the most unhealthy sores healthy. The oil removes maggots and keeps away flies. I consider it a most valuable dressing for foot-and-mouth disease in this country. As far as my experience goes, in such cases the great object is to prevent the sores from becoming fly-blown and maggoty. The natives are alive to this and tie the affected animals in a pool of water or mudhole which has the desired effect, a practice that is neither so speedy nor so effectual as the treatment I have recommended. In fact, I have seen some very bad cases of sloughing brought on by it through the sand or mud working into sensitive parts of the foot.

The recipe for the camphorated oil is given and recommended by Inspecting Veterinary Surgeon F. H. B. Hallen in his manual on the more deadly forms of cattle disease in India.

Order thereon, 3rd May 1876, No. 572.

Communicated to the Board of Revenue in continuation of G. O., dated 9th March 1876, No. 348.

(True Extract.)
(Signed) D. F. CARMICHAEL,
Secretary to Government.

NEW SETTLEMENT.

Proceedings of the Madras Government, Revenue Department, 23rd May 1876.

Read the following Proceedings of the Board of Revenue, dated 17th March 1876, No. 764:—

Read the following letter from C. RUNDALL, Esq., Acting Director of Revenue Settlement, to C. A. GALTON, Esq., Acting Secretary to the Board of Revenue, dated Madras, 12th January 1876, No. 84-6:—

As promised in paragraph 2 of the Annual Report for 1874-75, I have the honor to submit a report on the results of the new settlement during the corresponding Revenue year, Fusly 1284, in those districts and parts of districts newly settled during the preceding years.

No. 1,471-42 of 17th July 1875, to Board.

2. GODAVERY.—The results of this district show, as usual, an improvement when compared with the figures of the previous year, as indicated below. The increase is ascribed to the area in occupation during the year having extended owing to the favorableness of the season in the earlier months:—

Taluks.	Fusly 1283.	Fusly 1284.	Difference.
	RS.	RS.	RS.
1. Ramachendrapur	5,76,621	5,69,711	— 6,910
2. Amalapur	3,13,895	3,16,068	+ 2,173
3. Narsapur	3,99,717	4,05,400	+ 5,683
4. Tanuku	3,22,512	3,22,436	+ 76
5. Bhemaveram	3,01,542	3,40,056	+ 38,514
6. Ellore	1,66,181	1,66,786	+ 605
7. Rajahmundry	1,14,922	1,18,668	+ 3,746
8. Yarnagudum	93,745	94,216	+ 471
9. Peddapur	1,30,750	1,31,453	+ 703
Total...	24,19,885	24,64,794	+ 44,909

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The deficit observable in the Ramachendrapur Taluk is accounted for by the decrease in the growth of second crop, owing to the closing of the canals in the eastern and western deltas.

3. The demand of Fusly 1284 is Rupees 4,10,073 in excess of that of Fusly 1271, the year previous to the introduction of the new settlement into the western delta.

	RS.
Fusly 1271	20,54,721
Do. 1284	24,64,794
	+ 4,10,073

4. Kistna.—This district, like the Godavery, exhibits an increase, amounting to Rupees 58,744, over the demand of Fusly 1283; and Rupees 5,13,462 over that of the year previous to the introduction of the new settlement. The Masulipatam portion furnishes Rupees 2,82,327, and the Guntur portion Rupees 2,31,135 of the excess.

Portions of the District.	Demand of Fusly previous to the introduction of new Settlement.	Demand of Fusly 1284.	Difference.
	RS.	RS.	RS.
Masulipatam portion	5,79,350	8,61,677	+ 2,82,327
Guntur portion	24,24,992	26,56,127	+ 2,31,135
Total...	30,04,342	35,17,804	+ 5,13,462

The reasons for the increase over the previous year are almost identical with those noted for the Godavery; but the conversion of dry lands into wet in the delta taluks is stated to augment the return. There is a small decrease in Guntur and Vinnukonda by the relinquishments being greater than the darkhasts, but this will probably soon rectify itself.

5. The usual Talukwar details are recorded below:—

Taluks.	Fusly 1283.	Fusly 1284.	Difference.
	RS.	RS.	RS.
Masulipatam portion—			
1. Gudivada	3,99,653	4,11,892	+ 12,239
2. Bunder	1,45,667	1,49,570	+ 3,903
3. Nandigam	1,83,033	1,83,152	+ 119
4. Bezwada	1,17,534	1,17,063	— 471
Total...	8,45,887	8,61,677	+ 15,790
Guntur portion—			
5. Repalli	6,15,214	6,43,316	+ 28,102
6. Bapatla	5,29,421	5,44,570	+ 15,149
7. Guntur	3,99,105	3,96,980	— 2,125
8. Palnad	2,87,121	2,88,908	+ 1,787
9. Narasarowpet	3,12,648	3,13,785	+ 1,137
10. Sattanapalli	3,49,713	3,49,672	— 41
11. Vinnukonda	1,19,951	1,18,896	— 1,055
Total...	26,13,173	26,56,127	+ 42,954
Grand Total...	34,59,060	35,17,804	+ 58,744

6. South Arcot.—The results of the new settlement for this district apply only to the Chedambram Taluk. Operations have not yet been extended to the remaining portion of the district. The demand of Fusly 1284 aggregates Rupees 5,32,497, or Rupees 10,321 in excess of its predecessor. This increase is not wholly due to the growth of the assessment, but partly to change of revenue procedure, by which second crop assessment has been levied* on certain lands free in this respect up to Fusly 1283, and

* *Vide* Board's Proceedings, No. 208, dated 3rd February 1874.

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as well to the introduction of the new water-rate, in conformity with Board's Proceedings, No. 524, dated 9th March 1874, under which the charge is by the half cawny instead of on the actual area returned as irrigated. These changes account for Rupees 6,523, or more than half of the increase referred to.

7. The beriz of Fusly 1284 likewise exhibits an enhancement over the demand of the year previous to introduction:—

	RS.
Fusly 1270	5,20,605
Fusly 1284	5,32,497
	+ 11,892

	RS.
Demand of the year previous to introduction.	16,19,405
Do. Fusly 1284	14,36,767
	— 1,82,638
Settlement Demand at first introduced ...	12,20,007
Do. in Fusly 1284	14,36,767
	+ 2,16,760

8. Trichinopoly.—There is a slight increase in the demand of Fusly 1284 when contrasted with that of Fusly 1283; but the revenue is still much below that of the year previous to introduction. Still it is satisfactory to observe that Rupees 2,16,760 have been added to the demand since the original introduction as specified in the margin. The comparison of Fusly 1283 and 1284 is given below:—

Taluks.	Fusly 1283.	Fusly 1284.	Difference.
	RS.	RS.	RS.
1. Trichinopoly	4,58,237	4,57,712	— 525
2. Musiri	3,20,356	3,23,623	+ 3,267
3. Kulitalai	1,94,088	1,92,640	— 1,448
4. Perambalur	2,36,974	2,35,813	— 1,161
5. Udayarpolum	2,25,690	2,26,979	+ 1,289
Total...	14,35,345	14,36,767	+ 1,422

9. Kurnool.—The following statement compares the demand of Fusly 1284 with that of the preceding year. The result, like that for other districts already noticed, is favorable:—

Taluks.		Fusly 1283.	Fusly 1284.	Difference.
		RS.	RS.	RS.
Kurnool Proper.	1. Ramalkota	1,70,850	1,74,873	+ 4,023
	2. Naudikotkur	2,05,275	2,07,426	+ 2,151
	3. Nandial	1,86,267	1,87,343	+ 1,076
	4. Sirwoll	1,53,761	1,53,405	— 356
	Total...	7,16,153	7,23,047	+ 6,894
5. Pattikonda		2,01,644	2,04,329	+ 2,685
6. Koilkuntla		2,03,694	2,01,817	— 1,877
	Grand Total...	11,21,491	11,29,193	+ 7,702

By the new settlement the assessment of the four taluks of Kurnool Proper was reduced, as marginally indicated, to the extent of Rupees 35,851. The deficit, as explained below, now stands at Rupees 6,417 for Fusly 1284. Including the more recently settled taluks, there is an addition to the revenue of only Rupees 752.

	RS.
Demand of the year previous to introduction...	7,29,464
Do. as introduced in the first year ...	6,93,603
	— 35,851

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Taluks.	Beriz of Fusly previous to the introduction.	Beriz of Fusly 1284.	Difference.
	RS.	RS.	RS.
Kurnool Proper	7,29,464	7,23,047	— 6,417
Pattikonda	1,98,991	2,04,329	+ 5,338
Koilkuntla	1,99,986	2,01,817	+ 1,831
Total...	11,28,441	11,29,193	+ 752

10. Cuddapah.—This district now needs attention in respect to the taluks first settled as under:—

Taluks.	Fusly 1283.	Fusly 1284.	Difference.
	RS.	RS.	RS.
Cuddapah	2,39,139	2,31,498	— 7,641
Prodatoor	1,73,871	1,76,495	+ 2,624
Jamalamadugu	1,88,338	2,01,794	+ 13,456
Total...	6,01,348	6,09,787	+ 8,439

Whilst there is a falling off in the Cuddapah taluk, there is an increase in the other taluks, and on the whole an enhancement on the previous year's revenue of Rupees 8,439. Compared with the demand of the year previous to introduction, the addition is Rupees 15,341 as exhibited below:—

	RS.
Beriz of the year previous to introduction	5,94,446
„ Fusly 1284	6,09,787
	+ 15,341

11. The demand of Fusly 1282, given as Rupees 5,53,100 at paragraph 12 of Mr. Banbury's report recorded in Board's Proceedings No. 78, dated 15th January 1875, differs by Rupees 41,346 from the Rupees 5,94,446 now taken for comparison. Of this amount, Rupees 34,516 comprises second crop and additional assessment, brought to account, at the time of the Jamabundi, and included in the demand of the year, but which did not find a place in the comparison Mr. Banbury instituted. The particulars then furnished, though correct in respect to the actual results of the introduction, will not conform with the difference observable between the revenue returns of one year and the other. As the total revenue throughout this report is taken for comparison each year, it is requisite to take the corresponding total revenue for the year prior to the introduction, and not that given in reporting the results of the introduction. The variation in the first year arises partly as regards the charge for second crop and additional assessment, and partly in respect to change as to occupation between the period of introduction and the Jamabundi. The remaining sum of Rupees 6,830 needs to be accounted for under this latter cause. The same reason explains the difference noticeable between the figures of Pattikonda and Koilkuntla of the Kurnool District. It has to be borne in mind that the demand in the three taluks of Cuddapah is not fully realized, the increase by the rates as introduced being to some extent, where at all heavy, levied gradually by increments as directed by Government.

G. O., dated 24th July 1874, No. 919.

12. Salem.—This is the second year for which a comparison for the whole district is

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instituted. The result for the year is, I am glad to report, more favorable, being an enhancement of Rupees 26,043 as specified below:—

Taluks.	Fusly 1283.	Fusly 1284.	Difference.
	RS.	RS.	RS.
1. Salem	3,87,020	3,92,851	+ 5,831
2. Ahtoor	2,23,611	2,26,288	+ 2,677
3. Namkul	1,99,270	2,01,249	+ 1,979
4. Trichengode	2,75,393	2,82,596	+ 7,203
5. Darampuri	1,67,226	1,71,403	+ 4,177
6. Kistnagherry	1,38,266	1,40,428	+ 2,162
7. Ossoor	1,69,304	1,69,475	+ 171
8. Tripatore	1,05,671	1,05,217	— 454
9. Utteugherry	1,10,934	1,13,231	+ 2,297
Total...	17,76,695	18,02,738	+ 26,043

Vide paragraph 11 of Mr. Banbury's letter, recorded in G. O., No. 255, dated 17th February 1875.

		RS.
Beriz previous to new Settlement	...	18,26,265
Do. of Fusly 1284 ...	...	18,02,738
		— 13,527

The demand of 1283 was less by Rupees 49,570 than that of the year preceding the introduction. This year the deficit is reduced to Rupees 13,527, as per margin, by the extension of occupation. With Mr. Banbury I share the hope that "the deficit will ere long give place to a surplus."

13. NELLORE.—The new rates of assessment were put in force in the principal division taluks of this district for Fusly 1283. The revision of assessment then effected on the occupation of Fusly 1282 was as under:—

	RS.
By Revenue Accounts	11,28,804
„ Settlement	13,00,062
Increase...	1,71,258

The foregoing details are exclusive of the charge for second crop and additional assessment. Inclusive of these items, the demand of Fusly 1282 amounted to Rupees 11,67,881, and that for the succeeding year to Rupees 12,95,738; consequently, there was an enhancement of Rupees 1,27,657 on the demand of Fusly 1282 when compared with that of Fusly 1283. Particulars for the latter year are furnished below and compared with Fusly 1284. It will be seen that the result is satisfactory, the increase being Rupees 12,351:—

Taluks.	Fusly 1283.	Fusly 1284.	Difference.
	RS.	RS.	RS.
1. Nellore	5,40,585	5,31,135	— 9,450
2. Gudur	2,72,285	2,79,539	+ 7,254
3. Rapur	86,267	93,009	+ 6,742
4. Atmakur	1,95,151	1,98,023	+ 2,872
5. Kavali	1,52,028	1,56,545	+ 4,517
6. Udayagiri	49,422	49,838	+ 416
Total...	12,95,738	13,08,089	+ 12,351

The falling off in the demand in the Nellore Taluk is not due to any less breadth of occupation, but to amendments effected, under the order marginally specified, to the wet rates of assessment as first imposed throughout the anicut villages. The assessment of 1284 was reduced to the extent of Rupees 19,008 less than that brought to account for 1283. An increase of area under occupation, 1,084 acres in dry and 500 acres in wet, partly recouped the amount foregone.

G. O., dated 16th October 1874, No. 1,333.

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14. It will be remembered that under G. O., No. 896, of 22nd August 1873, the increase on puttas was foregone, and all decrease allowed to the ryots for Fusly 1283. For Fusly 1284 the increase, as directed by G. O., No. 1,333, dated 16th October 1874, was levied gradually by increments. Compared with the total demand of Fusly 1282, the year before the introduction, the corresponding assessment of Fusly 1284 indicates an enhancement of Rupees 1,40,208.

Fusly.	RS.
1282	11,67,881
1284	13,08,089
Increase...	1,40,208

15. During Fusly 1284 the new rates of assessment were introduced into the Sub-division taluks of Nellore with the following result:—

Taluks.	Revenue Demand of Fusly 1283.	As per introduction of new Settlement.	Difference.
	RS.	RS.	RS.
Kandakur	2,66,585	2,73,656	+ 7,071
Kanigiri	35,871	40,556	+ 4,685
Ongole	2,79,154	3,03,302	+ 24,148
Total ...	5,81,610	6,17,514	+ 35,904

16. Tinnevelly.—The new rates were in force for two years, Fuslies 1283 and 1284, in the Tinnevelly and Tenkasi Taluks, but no reference was made to this district in the report last submitted, consequent on the settlement of the district not then being under the Director's control. The comparison between the demands of Fuslies 1283 and 1284 shows a small increase of Rupees 1,746 as under:—

Taluks.	Fusly 1283.	Fusly 1284.	Difference.
	RS.	RS.	RS.
Tinnevelly	3,29,782	3,30,938	+ 1,156
Tenkasi	1,78,048	1,78,638	+ 590
Total...	5,07,830	5,09,576	+ 1,746

17. Great variations need not be anticipated as regards these taluks. The irrigation is superior, the lands are fertile, and the rates are moderate. There is therefore no likelihood of relinquishments, nor is there any particular extent of waste to be newly taken up. The comparison with the beriz of the year previous to introduction, viz., Fusly 1282, shows a gain of Rupees 8,207 as indicated in the margin.

	RS.
Demand of Fusly 1282 as shown in Mr. Puckle's report, dated 22nd August 1874.	5,01,369
Do. of Fusly 1284	5,09,576
	+ 8,207

The usual comparative statement is appended of the settlement commutation rate determined for each district, subject to the deductions for cartage, &c., and of the prices prevailing during Fusly 1284 (1874-75). Throughout the settled districts, it will be seen that the price of each product ruled more or less in advance of the commutation rate save in respect to Varagu for Salem, in which district an average was formerly struck on the price of the dry grains taken as representative crops. Adopting the same course now, the prices returned average Rupees 119 against the commutation rate of Rupees 100. The result, therefore, is everywhere favorable to the ryot. The percentage, as regards the whole of the districts, that the prevailing prices for each grain exceeded the commutation rate, is as below:—

Paddy	36
Cholum	47
Cumbu	70
Raggy	56
Varagu	48

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Enclosure No. 1.

Districts.	Paddy, 1st and 2nd Sort.			Cholum.			Cumbu.			Raggy.			Varagu.		
	Commutation price per Garce.	Average price of past year framed in accordance with Settlement procedure for this District.	Percentage of increase in the prevailing price over the commutation rate.	Commutation price per Garce.	Average price of past year framed in accordance with Settlement procedure for this District.	Percentage of increase in the prevailing price over the commutation rate.	Commutation price per Garce.	Average price of past year framed in accordance with Settlement procedure for this District.	Percentage of increase in the prevailing price over the commutation rate.	Commutation price per Garce.	Average price of past year framed in accordance with Settlement procedure for this District.	Percentage of increase in the prevailing price over the commutation rate.	Commutation price per Garce.	Average price of past year framed in accordance with Settlement procedure for this District.	Percentage of increase in the prevailing price over the commutation rate.
	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
Godavery	72	107	49	84	122	45	60	113	88	66	114	73	...	...	...
Kistna ... { Masulipatam portion.	90	137	52	95	182	92	70	167	139	...	...	...	...	...	...
Kistna ... { Guntoor portion ...	100	116	16	112	155	38	...	...	...	...	...	...	86	144	33
South Arcot, Chedambram Taluk	72	153	113	117	211	80	93	178	91	93	178	91	52	92	77
Trichinopoly	67	126	90	100	130	30	83	128	54	83	126	52	50	87	74
Kurnool. { Kurnool Proper ...	110	145	32	105	158	50	...	...	...	...	...	...	60	106	77
Kurnool. { Pattikonda	120	131	9	125	137	10	...	...	...	...	...	...	...	...	...
Kurnool. { Koilkuntla	126	140	11	139	195	40	...	...	...	...	...	...	...	...	...
Cuddapah	126	140	11	139	195	40	...	...	...	...	...	...	...	...	...
Salem	100	132	32	100	157	57	100	103	3	100	118	18	100	97	3
Nellore	107	141	32	129	185	43	...	...	...	...	...	...	64	115	80
Tinnevelly	108	168	65	...	...	...	...	...	...	...	...	...	...	...	...
Total...	1,198	1,636	36	1,245	1,827	47	406	689	70	342	536	56	412	611	48
Average...	100	136	36	113	166	47	81	138	70	86	134	56	69	102	48

Revenue Settlement Office, Madras, 12th January 1876.

(Signed) C. RUNDALL,
Ag. Director of Revenue Settlement.

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Submitted to Government in continuation of Board's Proceedings, dated 12th August 1875, No. 2,262, recorded in G. O., dated 24th September 1875, No. 1,977.

2. The revenues of Fusly 1284 under the new settlement show an increase on those of the previous fusly of Rupees 44,909 and Rupees 58,744 in the Godavery and Kistna Districts, respectively. The increase over the assessment of the years preceding those in which the settlement was introduced are Rupees 4,10,073 and Rupees 5,13,462, respectively.

In Nellore, the increase by settlement over the assessment previous to settlement was large (Rupees 1,27,657), and there were smaller increases in the districts of Kurnool, Cuddapah, South Arcot and Tinnevelly.

3. In Trichinopoly, the demand under Settlement is still Rupees 1,82,638 below the former assessment, though it has risen considerably since the introduction of the settlement.

In Salem, also, the demand, though rising, is still below the amount of the assessment prior to settlement. In each of the settled tracts, the results of the year under report show an improvement over those of the preceding year.

4. The report indicates satisfactory revenue administration as far as judgment can be formed on such returns. The prices throughout the settled districts almost invariably ruled considerably in advance of settlement commutation rates, the incidence of which may consequently be confidently assumed to be light.

(True Copies and Extract.)

(Signed) C. A. GALTON,

Acting Secretary.

Order thereon, 23rd May 1876, No. 665.

Recorded.

(True Extract.)

(Signed) D. F. CARMICHAEL,

Secretary to Government.

Exploration of Archæological remains in the Kistna District.

Proceedings of the Madras Government, Revenue Department, 24th May 1876.

Read the following letter from ARTHUR HOWELL, Esq., Officiating Secretary to the Government of India, Home Department (Public), to the Hon. W. HUDLESTON, Chief Secretary to the Government of Madras, dated Simla, 6th May 1876, No. 817 :—

I am directed to acknowledge your letter, No. 1,564, dated the 3rd November last, regarding the proposed exploration of certain archæological remains in the Kistna District.

2. In reply, I am to forward the accompanying letter* from the Director-General, Archæological Survey, on the subject, and to say that the Governor-General in Council is pleased to sanction the disbursement of Rupees 1,000 for carrying on the explorations on the understanding that this sanction is final. There is no objection to Mr. Sewell being entrusted with the duty. He should, however, be instructed to proceed in the manner indicated by General Cunningham. All coins, stamps, seals, and minor articles of interest will, of course, be carefully collected, preserved, and described.

* No. 295, dated 6th March 1876.

Enclosure No. 1.

From Major-Genl. A. CUNNINGHAM, Director-General, Archæological Survey, to the Secretary to the Government of India, Home Department, Calcutta, dated Agra, 6th March 1876, No. 295.

I have the honor to return herewith the bundle of papers connected with the proposed exploration of the archæological remains in the Kistna District by Mr. R. Sewell, Acting Head Assistant Collector of the Kistna District. These papers reached me in camp just before I proceeded to Calcutta in December last, and I had intended examining Colonel Mackenzie's manuscript volumes in the Bengal Asiatic Society's Library before making my reply, as I was aware that those volumes contained a map of the site as well as a plan of the ruined Stûpa of Amaravati. Unfortunately the matter escaped my memory whilst I was in Calcutta, and I have not been able to find the notes on the Amaravati Stûpa which I made in England after examining the copy of Colonel Mackenzie's manuscript books in the Library of the India Office. I must, therefore, trust to my memory in making the following recommendations.

2. As well as I can remember the whole of the *Stûpa* itself has been removed, even including its foundations, so as to form a circular tank surrounded by a high mound. This mound I believe to have been formed of the rubbish and earth thrown out from the excavated stûpa, and beneath it lies the remains of the double railing which once surrounded the monument. It is, therefore, very much to be desired that the whole of this circular ring of mound should be explored, and I would recommend that the work should be begun from the interior of the circle, the whole of the excavated earth and rubbish being thrown into the central tank.

3. In making these explorations it is especially desirable that all standing stones or stone-

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work in situ should be left undisturbed until the exact position of each piece and a general plan of the whole have been made by some competent surveyor. As Mr. Sewell himself seems to be fully alive to the importance of leaving such stones in their original places, the work of exploration might safely be entrusted to him, and I would most strongly recommend that the sum of one thousand rupees, which has been asked for this purpose, should be granted to him.

4. Mr. Sewell's other proposed explorations of the caves at Undavilly, of the Bhattiprole Tope, and of the circular mound at Pidgurala seem also worthy of being carried out. But in the meantime I would recommend that a strict scrutiny should be made of all the carved stones in the town of Amaravati and its neighbourhood for some of the missing sculptures of the Amaravati Stûpa, and that impressions of all inscriptions should be carefully made, and if possible that photographs should be taken of them.

5. I remember noting in Colonel Mackenzie's map of the site a single rock, near the bank of the river *above* the town, labelled "*Sasanam Rock.*" As this name suggests the existence of an *edict* engraved on one of the rocks, I strongly recommend that a careful examination should be made of all the rocks in the position indicated.

6. In conclusion I beg to express my opinion that inscriptions should be most diligently sought for, as it is to them that we must look for the *history* of the Stûpa. We already possess more than a sufficient number of sculptures to show the style of art which prevailed when the Stûpa was erected. From the sculptures Mr. Fergusson has inferred that it must have been built in the fourth century A.D. From the inscriptions on the contrary I infer that it was erected towards the end of the first century A.D. As the forms of the alphabetical characters afford a much surer criterion than the style of the sculptures for determining the date of any building, I trust that the importance of securing every fragment of inscription may be kept in mind.

Order thereon, 24th May 1876, No. 684.

As the sum asked for (Rupees 1,000) is now granted, and the services of Mr. R. Sewell are still available, as Acting Head Assistant of the Kistna District, with his head-quarters at Bezwada, authority is given for making the excavations proposed. Mr. Sewell will profit by General Cunningham's suggestions.

(True Extract.)

(Signed) D. F. CARMICHAEL,

Secretary to Government.

MR. COOKE'S REPORT ON THE DECEASED LEAVES OF COFFEE AND OTHER PLANTS FROM MYSORE.

Proceedings of the Madras Government, Revenue Department, 2*nd June* 1876.

Read the following despatch from the Right Honorable the Secretary of State for India:—

Revenue, No. 8. INDIA OFFICE, LONDON, 27*th April* 1876.

MY LORD DUKE,—I have to acknowledge the receipt of your Grace's despatch, dated the 9th of March (No. 4), 1876, forwarding the report of the Travancore Planters' Association on the Coffee-leaf disease.

2. I herewith transmit two hundred copies of a Report by Mr. Cooke, of the India Museum, on the diseased leaves of Coffee and other plants which were forwarded from Mysore for examination. Copies of the Report should be forwarded to the Coffee Planters in Wynaad, the Nilgiris, and Travancore.

Sent by last Mail.

I have, &c.,

(Signed) SALISBURY.

His Excellency the Right Honorable The Governor in Council, Fort St. George.

Order thereon, 2nd June 1876, No. 750.

Ordered that the Reports referred to in paragraph 2 of this despatch, when received, be forwarded to the Conservator of Forests for distribution as desired by the Secretary of State.

(True Extract.)

(Signed) D. F. CARMICHAEL,

Secretary to Government.

COMMERCE AND NAVIGATION BETWEEN THE UNITED KINGDOM AND FRANCE.

Proceedings of the Madras Government, Revenue Department, 6*th June* 1876.

Read the following letter from C. J. LYALL, ESQ., Under-Secretary to the Government of India, Department of Revenue, Agriculture and Commerce, (Commerce and Trade,) to the Hon. D. F. CARMICHAEL, Secretary to the Government of Madras, Revenue Department, dated Simla, 24th May 1876, No. 214:—

I AM directed to forward the accompanying copy of a despatch (No. 29, dated the 12th April last) from the Secretary of State for India giving cover to copy of a communication from the Foreign Office regarding the representations it will be desirable to make in the interests of India to the French Government in the approaching negotiations for a new treaty of

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Commerce and Navigation between the United Kingdom and France; and, with reference thereto, to request that, after consultation with the Chamber of Commerce at Madras and such local firms doing business with France as it may be considered desirable to consult, the Government of India may be favored with an expression of the views of His Grace the Governor in Council on the subject.

2. I am to request that a very early reply may be submitted.

ENCLOSURE No. 1.

Despatch from the Right Honorable the Secretary of State for India.

Statistics and Commerce, No. 29. } INDIA OFFICE, LONDON, 12th April 1876.

MY LORD,—I transmit, for the information of your Excellency, a copy of a correspondence with the Foreign Office on the subject of the representations which it is desirable to make, in the interests of India, to the French Government in the approaching negotiations for a new Commercial Treaty between the United Kingdom and France.

From Foreign Office, 9th March 1876, (with enclosures.)
To Foreign Office, 11th April 1876.

2. You will observe that I have expressed a general opinion that it is desirable to obtain the utmost facilities which can be granted for the admission into French ports of Indian produce and manufactures, free of duty. An important increase may be expected to occur in the direct trade with France, as one of the results of the opening of the Suez Canal, and it will be for your consideration to what extent the interests of India and the interests of your revenue might be consulted by alterations in this direction.

3. I shall be glad to be favored, as early as possible, with the views of your Government on the question generally, and in regard to any special details connected with either trade or navigation which you would wish to have represented to the French Government.

I have, &c.,
(Signed) SALISBURY.

His Excellency the Right Honorable
The Governor-General of India in Council.

ENCLOSURE 1 in No. 1.

From T. V. LISTER, ESQ., to the Under-Secretary of State for India, dated 9th March 1876.

I am directed by the Earl of Derby to state to you, for the information of the Marquis of Salisbury, that it is expected that communications will very shortly take place with the French Government with the view to the conclusion of a new Treaty of Commerce and Navigation between this country and France.

2. The existing Treaties and Conventions of 1860, 1873, and 1874, of which copies are herewith enclosed, will remain in force until the 30th of June 1877; but the two Governments are of opinion, in the present state of commercial relations between European Powers, that it is advisable that they should enter into communication, in order to come to an understanding as to the future Treaty engagements between the two countries in matters of commerce and navigation.

3. It will be perceived that the arrangements made in 1860 are limited to the United Kingdom and to France and Algeria, and do not extend to the possessions of the other Power except in regard to Australian wool and to Indian cotton and jute. And, further, that the Treaty of 1873 places British and French vessels on a footing of equality in all navigation.

4. I am to request that you will move the Marquis of Salisbury to give this matter his early attention, and to inform Lord Derby, as soon as possible, what representations he would wish to be made to the French Government in matters affecting Indian interests in the approaching negotiations with France.

5. I am, at the same time, to point out that, when stipulations are made wth foreign countries in favor of British possessions, those possessions may have to be bound by the engagements entered into by Her Majesty's Government in matters relating to the United Kingdom.

ENCLOSURE 2 in No. 1.

From Sir LOUIS MALLET, C.B., to the Under-Secretary of State for Foreign Affairs, dated India Office, 11th April 1876.

In reply to your letter of the 9th ultimo, I am directed by the Secretary of State for India in Council to say that, in his opinion, it is very desirable that, in the anticipated negotiations with the French Government for a new commercial treaty, an endeavour should be made for the admission of the raw produce and manufactures of India into French ports free from duty, to the utmost possible extent.

2. The question is, however, one on which it is necessary to consult the Government of India, to whom your letter will at once be forwarded.

Order thereon, 6th June 1876, No. 756.

Referred to the Board of Revenue for report after communication with the Collectors of some of the more important coast districts and the

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Chamber of Commerce and some of the leading firms doing business with France.

2. It is observed from the volume of the Trade and Navigation of the Madras Presidency for 1873-74 that the value of the exports to, and imports from France amounted to Rupees 84,86,001 and 51,924 respectively, as particularised in the margin;

	Exports.	Imports.
	RS.	RS.
Ganjam ...	6,92,350	596
Vizagapatam...	17,45,711	831
Godavery ...	10,08,411	8,355
Kistna ...	75,434	...
Tinnevelly ...	89,998	...
South Canara.	5,89,484	2,052
Malabar ...	42,84,613	40,090
Total...	84,86,001	51,924

and that the value of imports and exports of Merchandise and Treasure from and to Pondicherry and British Indian Ports amounted to Rupees 4,03,013 and 2,87,561; the trade with Mahé and Karikal being comparatively insignificant. It is requested that in submitting the report here called for, the Land Customs revenue may be taken due note of. The revenue from this source amounted, in 1874-75, to Rupees 2,64,287, and showed an excess of Rupees 44,974 over that of the previous year, which is said to have resulted solely from the importation of goods into Tanjore, *via* Karikal, instead of Nagore.

3. The Board will observe that the Government of India called for a very early report on the subject. The Board's early attention is, therefore, requested to it.

(True Extract.)

(Signed) D. F. CARMICHAEL,
Secretary to Government.

MISCELLANEOUS.

CINCHONA.

The medicinal Cinchonas are all natives of South America, and are there confined to a comparatively narrow belt of the Andes extending from 10 degrees N. to 20 degrees S. latitude. The most valuable species are found within the territories of New Granada, Ecuador, Peru, and Bolivia, the Governments of which States have for a long time derived a considerable revenue from the bark exported to Europe. But with the usual shortsighted policy of Governments where matters of Forestry are concerned, they have never made any efforts whatever to control the operations of the bark collectors, so as to ensure a continued supply of bark. The Cascarillados, as these collectors are called, were (and are still) used not only to fell immature trees, but even to dig them up by their roots for the sake of the rich red bark. The Governments however regarded the cinchona forests as "practically inexhaustible;" a familiar phrase this in the early days of Indian Forest management, and were too lazy to institute measures of conservancy. The inevitable consequence of all this was that the trees in easily accessible places having been felled, bark began to get scarce and Quinine to rise in price. The Dutch Government are large consumers of Quinine in their Colony of Java, and they began to get alarmed at the increasing amount of their bills for that medicine. They accordingly determined to grow their own cinchona bark, and with this view they sent in the year 1853, a botanical collector to South America, charged with the duty of collecting seeds and seedlings of the best medicinal species and of taking them to Java. The gentleman who undertook the mission was apparently successful, for towards the end of 1854, he landed in Java with a large quantity of young cinchona plants. But as it ultimately turned out, his success had been more apparent than real, for after these plants by time had been increased to about a million, the Dutch discovered that they were of the wrong sort and that their bark contained but little Quinine. Six years later, our own India office organised a collecting expedition to South America, which was more successful than the Dutch one, and by the end of 1862, cinchona plantations had been begun on the Nilgiris and in British Sikkim. The new cultivation was eagerly taken up by coffee planters in the Nilgiris and Wynaad, who planted belts of cinchona along the roads on their estates, and in some cases devoted special tracts of land to cinchona cultivation alone. The same sort of thing was done, but to a much more limited extent, by the Tea planters of the Darjeeling district. In that district however, only one private garden entirely devoted to cinchona has ever been formed. Later in the day, the Coffee planters of Ceylon took up cinchona as an adjunct to their coffee, which began to be threatened with serious damage from leaf disease, and so well has the cultivation answered in that Colony, that there are at present estimated to be about 3,000 acres under cinchona.

The medicinal cinchona barks are of three sorts, known as *red*, *yellow*, and *pale*. These are respectively the produce of *cinchona succirubra*, *calisaya*, and *officinalis*. All three are plants which cannot be grown on any part of the plains of India. They require a cool climate, but cannot stand frost, and they positively decline to grow on flat land anywhere. An equable climate with a mean annual temperature of 65° to 70° Fht. suits them best. But the minimum temperature during the year must not fall much below 40° Fht. nor the maximum rise much above 80° Fht. These conditions will be found in India at elevations varying

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from 2,000 to 7,000 feet above the sea according to latitude. With regard to rainfall, cinchonas are rather accommodating. Provided the drainage be good, they will thrive where the fall is even 150 inches a year. The red bark trees will on the other hand, if the moisture is pretty equally distributed over the year, get on very well with an annual fall of as little as forty inches or even less. In the matter of soil, cinchona need not be tried in any situation where the subsoil is stiff and retentive of moisture. A free open surface soil rich in humus, suits all the species very well. In the Nilgiris, the basis of the soil is decayed gneiss: in Sikkim it consists of the *detritus* both of that rock and of *mica schist*. Of the three species, *officinalis* stands cold best; *calisaya* and *succirubra* get on better at lower elevations, but the bark of both the latter, if grown below 2,000 feet, is apt to be poor in Quinine.

Cinchona seeds are flat, thin, and very light. If not very carefully sown they are apt to rot. The best way to treat them is to strew them on the surface of well prepared beds of fine vegetable mould, and to cover them merely with a fine sprinkling of sand. If buried in the soil, the seeds are almost sure to decay. The seed beds should be carefully watered by a very finely-drilled garden syringe; and deluging should be carefully avoided. When the seedlings have got a couple of pairs of leaves, they should be transplanted, and picked out in nursery lines at distances of 1½ by 2 inches. In these nurseries, the plants should remain until they are about 4 inches high, when they will be ready for transplanting a second time, at distances of 4 by 4 inches. The seed and nursery beds should be protected by a sloping thatched roof from 3 to 5 feet high. As soon as the plants are 9 to 12 inches high, they should be transplanted for the last time into the open ground where they are permanently to stand. By this time, they will be about a year old. The final transplantation should be carried on in moist, dull but not very rainy, weather. No shading is as a rule necessary after this final transplanting. Red bark is more easily propagated by cuttings than by seed: *calisaya* on the other hand is difficult of propagation by artificial means; but as the species is very variable as regards the quality of the bark, and as it is extremely liable to sport (*i. e.*, not to come true to seed) seedlings cannot be relied on as likely with any certainty to possess the qualities of their parents. Cinchona has been successfully grown in Sikkim, the Nilgiris and Ceylon. It has done moderately well on the Tinnevelly and Shevaroy ranges in Madras, as also in British Burmah and the Khasia hills. On the other hand, it has more or less failed in the Wynaad, Ganjam, Mullunmally hills, Coorg, Travancore, Pulneys (?), Mahabaleshwar, N. W. Himalaya, and Kangra valley.—*The Indian Agriculturist*, Vol. I, p. 90.

THE CAMPHOR-TREE.

The wasteful manner in which the camphor of commerce has hitherto been obtained, certainly gives reasonable grounds for the belief which is very generally entertained that the trees which yield this valuable product, will at no distant date be exhausted in the places to which they are indigenous, unless measures are in time taken for introducing their cultivation into new and suitable localities and for bringing them under some strict system of conservancy, which shall ensure a regular succession of trees to be periodically operated upon. The reproduction of the tree is believed to be attended with but little difficulty; and, as new industries are being gradually developed and new products of economic value are being extensively introduced, it seems to be well worth a careful trial whether the cultivation of the camphor tree might not be successfully established in the peninsula of India.

The camphor tree flourishes in the northern parts of the island of Sumatra, where it is indigenous, but is not to be found to the southward of the Line nor yet beyond the third degree of north latitude. It propagates itself among the mountains and in the woods lying near the sea coast and needs no cultivation. It is straight and extraordinarily tall and has a gigantic crown, which overtops the largest trees around it by a hundred feet or thereabouts. The stem is sometimes twenty feet in girth. The tree comprises three varieties, which can be distinguished at a glance by the external colors of the bark, which is sometimes yellow, sometimes black and often red. The leaves are small, of a roundish, oval shape and of a dark green color, besides being hard and tough and with a strong smell of camphor. The fibres run straight and parallel to each other and terminate in a remarkably long and slender point. In outward form the fruit is very like the acorn, only it is surrounded with five petals, which are placed somewhat apart from each other and give it some resemblance to a lily. The fruit is always impregnated with a strong flavor of camphor and is eaten when it is well ripened and fresh. The amazing height of the tree hinders its regular gathering; but when the tree yields its fruit in March, April and May, the collection of it commences.

The camphor is found in the concrete state, in which we see it, in natural fissures or crevices of the tree, and in the knots and swellings of branches from the trunk, but of which it exhibits no indications externally. Consequently, the people, who are employed in collecting it, either make deep incisions into trees or even cut them down almost at random, until they come upon a trunk, which contains the aromatic resin. It is said that not a tenth part of the number of trees felled is found to contain either camphor or even camphor-oil, which is less rare, and that parties of men are sometimes engaged

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for two or three months together in the forests with very precarious success. This scarcity tends to enhance the price of the substance. When a tree containing camphor is cut down, it is divided transversely into several blocks, which again are split with wedges into small pieces, from the interstices of which the camphor in grains and scales is extracted. The substance which comes away readily in large and almost transparent flakes, is esteemed the prime sort or head; the smaller and clean pieces are considered the belly; while the minute particles, chiefly scraped from the wood and often mixed with small bits of it, are called the foot, according to the customary nomenclature adopted in the assortment of drugs. The process observed in freeing the camphor from foreign substances and other impurities is to steep and wash the crude article in water, sometimes with the aid of soap. It is then passed through sieves or screens with meshes of varying sizes to assist in its assortment, so far as it depends upon the size of the grains. Much, however, of the selection is also made by hand; and particular care is taken to distinguish from the natural camphor the article that is produced by an artificial concretion of the essential oil.

Doubts were once entertained whether the oil and the dry crystallised resin were simultaneously yielded by the same individual tree. Although the oil and the resin are often found in separate trees, the same tree has as often been known to contain both together. The people of Sumatra often pour the oil of inferior camphor trees into a log of wood with natural cracks in it and expose it to the sun daily for a week, by which time the oil acquires the consistency of genuine camphor, though it is universally considered to be the worst quality of the resin. It is conjectured that, as the tree advances in age, a greater proportion of this essential oil takes a concrete form, for it has been observed that even when the fresh oil has been allowed to stand and settle, a sediment of camphor is deposited at the bottom of the vessel; consequently, the yield of camphor depends mainly upon the age of a tree. The quantity varies from half a pound to sometimes four or five pounds per tree.

It is believed to be very unhealthy to remain near the camphor tree during the flowering season because of the extraordinary heat exhaled from it during that period. At the time the camphor is gathered—that is, during the cutting down of the trees—the oil, which then drips from the cuttings, is caught in considerable quantities. It is seldom brought to market, probably because the price and trouble of carriage are not sufficiently remunerative. It is so fine that a paper saturated with it and held near a flame, catches fire immediately and burns till the oil is entirely consumed. It is a very volatile essential oil, holding in solution a resin which on a few days' exposure to the air is left in a syrupy state. It also yields a small quantity of crystallised camphor on distillation through a very rough extempore process. Camphor is largely used in China for embalming; and an inferior quality of it is sold for medicinal purposes in the bazars of India. The oil has sometimes though rarely found its way into the London market. The fruit, prepared with sugar, furnishes a tasty comfit or article of confectionery. The oil is used as a popular remedy for rheumatism and is rubbed over the affected part. It may also be used as a fragrant, quickly drying and well bodied varnish, but it should be rubbed dry like French polish.

The price of the second quality of camphor in 1870 was, on an average, 3*l*. 13*s*. 3*d*. per cwt., and the quantity imported into Great Britain in that year aggregated 12,368 cwts., valued at £45,249. The imports of the first quality amounted to 2,361 cwts., valued at £14,496, giving an average price of 6*l*. 2*s*. 10*d*. per cwt.

The wood of the camphor-tree is in much esteem for carpenter's purposes; being, besides light and durable, also easy to work and not liable to be injured by insects. It is, however, said to be more affected than most other timbers by atmospheric changes. Furniture made out of it in China is much prized, as the wood keeps off insects. The best description of charcoal for smith's work is made from this wood.

The tree, which produces Camphor in Sumatra and also in Borneo, has been named *Dryobalanops camphora* by Colebrooke, though Roxburgh has called it *Shorea camphorifera*.

A species of camphor is also produced in Japan from a tree growing in abundance there. It is known to botanists by the name of *Laurus camphora*, and is of a different character altogether from the tree found in Sumatra and Borneo. According to Kæmpfer, the camphor in Japan is extracted by distillation from the wood and roots of the tree, cut into small pieces; and the form of the lumps, in which it is taken to the market, clearly shows that the substance has really been subjected to some process. This camphor evaporates till it wholly disappears; but, at all stages of its diminution, retains its full proportion of strength, which does not seem the property of an adulterated or compounded body. Camphor is also manufactured very extensively in China, where the island of Formosa is the chief seat of the industry. The tree yielding is described as an evergreen shrub and is probably of the same or a similar species as the *Laurus camphora* or camphor laurel of Japan.

We should be glad to see some experiments tried with the cultivation of both the Sumatra and Japan trees in suitable localities in the Peninsula, and, if as both are described to be rough and hardy and easy of propagation, they are in time acclimatised here, their introduction will tend to the establishment of a new and valuable industry among the people of India.—*Idem*, p. 153.

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THE COCHINEAL INSECT.

Although the discovery of the aniline dyes has to a great extent superseded the use of cochineal and reduced its commercial value, the splendid carmine dye yielded by the insect has not yet been completely driven out of the market, and it may therefore be of some interest to give an account of its habits, and of the methods by which it is propagated. The tribe of insects from which the cochineal dye is obtained, is known under the name of *coccina*, which lives and feeds upon the leaves of certain species of the cactus, namely, the *Opuntia coccinellifera* and the *O. tuna*. The male of the full grown cochineal insect (*Coccus casti*) has two dark wings, the antennæ ten times articulated, and two long tail bristles. The body is of a crimson color. The female is of the same color, but covered over by a white film. The native country of this species is Mexico, whence since 1526 it has, after being dried on sheets of hot iron, formed a very important article of export. Till the year 1725 the breeding of the insect was entirely confined to Mexico, and the Government with the greatest care kept it a secret. Before that period it was generally believed in Europe that the cochineal was not an insect, but a kind of seed. Acosta was the first who pointed out the animal nature of the dye. In the year 1785, Thierry de Menonville, a Frenchman, with the greatest danger to his life, brought away a few living insects to French Domingo, where they were soon acclimatised. In 1827 they were introduced into the Canary islands, and later still, with the best results into Corsica, Spain, Algeria, Java, and finally, into Teneriffe. In Mexico the insect is found at all times, with the exception of the rainy season, in different stages of development, on the *Opuntia*, locally called "Nopal"—the plant being sometimes completely covered with its white excretions. Entire plantations of this cactus have been known to be killed off by the large numbers of insects which infest the surface of the plants, and suck them dry of their sap. The female insect uses the white web-like substance to deposit her eggs therein, very soon after which she draws off her proboscis from the surface of the plant, falls to the ground and dies. Eight days after, the young larvæ appear resembling their mother, but showing a covering of very fine, long bristles. During the first fourteen days, they cast their skins several times and attain their full size. The male larva then spins a cocoon of the white fibre, open at the hind end, and rests in it, transformed into a chrysalis, during eight days. Being then fully grown it begins without loss of time to search for a female and dies very shortly after coition. The female lives a fortnight longer, busy in depositing eggs. A whole generation of these insects comes into existence and passes out of it in the brief period of a few weeks. Considering the short period required for the development of a generation, it is evident that several generations are produced during a single season. Mr. Bouche, the Director of the Botanic Garden at Berlin, succeeded in raising in his stove-houses four generations of cochineal in succession by keeping up a temperature of 72 degrees Fahrenheit.

The cochineal planters in Mexico collect, before the setting in of the rainy season, a quantity of the branches of the *Opuntia* plant with the brood on them, and place them in sheltered parts of their houses. The insects remain alive on the leaves, which continue succulent for a long time. The rainy season being over, the insects on the branches are again distributed over the plantations. The Mexicans also collect another sort of cochineal which is known as *Grana sylvestra* from the wild growing *Opuntia cactus*, and, though belonging to another variety of *coccina*, is believed to be capable of being harvested more frequently. When Mexico was alone producing this valuable coloring matter, 880,000 pounds of it, estimated to be of the value of about £640,000, were annually exported to Europe. In South Spain and in Teneriffe, since the vine disease appeared, the *Opuntia* cactus has been cultivated; and in 1850 they exported nearly 800,000 lbs. of cochineal. Now as it has been ascertained that about 70,000 of these insects go to make up the weight of one pound, it is easy to guess what immense quantities of them must be annually reared to meet the demand for cochineal. The packages in which cochineal is exported by the Spaniards, consist of green bullock hides with the hairy surface inside.

On examination the cochineal of commerce shows the insect shrivelled up to the size of a small pea, the outside of a dark brown color, the inside dark purple and more or less covered by a silvery grey dust. The coloring principle of the cochineal is said to retain its properties for more than a hundred years. When soaked in warm water, the legs and antennæ may be easily recognised. According to its native country and the different methods in which it is treated, the cochineal is called either *grana*, or, when of the finest quality, *mestica*, from Mestique in Honduras, where it is produced. The inferior quality is *Crana sylvestra* or *Gapesiana*, and consists of smaller sized insects. *Renegrida* is the cochineal of insects killed by immersion in hot water and stripped of their white covering. *Jaspeada* comprises every sort in which the white dusty coloring is preserved. Finally, *granila* is cochineal much damaged in transit, in fact an article inferior in every respect. Professor Pereira, in his *Materia Medica*, has distinctly stated that the adulteration of cochineal was some time ago very extensively carried on in London. By being moistened with a solution of gum arabic and shaken in a box, first with sulphate of baryta and then with powdered animal charcoal, cochineal of

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inferior quality could be made to acquire the appearance of the first class article and to increase its specific weight from 1·25 to 1·35. Talc and plumbago powder were likewise used to give the cochineal a beautiful silver-grey appearance. But these different methods of adulteration may be easily detected by the aid of the microscope.

The carmine or real coloring principle of the cochineal is obtained by treating it first with ether for the purpose of removing animal grease, and then with boiling alcohol, which entirely draws the color away.

The *Opuntia tuna* and *O. coccinellifera* have been successfully introduced into Australia, where they are growing luxuriantly at Adelaide; and it is believed that the cochineal insect can also be naturalised there, if, during the rainy season, it is properly sheltered, as in Mexico.

Although according to Dr. Lindley "America is the exclusive station of this order, (*cactaceæ*) no species appearing to be a native of any other part of the world, several species of it, including many varieties of the *Opuntia*, must at a very early period have been introduced into India, where it is now naturalised and growing in wild profusion in the jungles. The *Opuntiæ* produce large, oval formed, thick, flat leaves, one from the edge of the other and usually covered with sharp bristles arranged in the shape of stars. Sometimes they bear large golden yellow flowers of metalic hue.

The cochineal insect has been long and generally known to be indigenous or acclimatised in most parts of India; but its produce has always been erroneously regarded as so inferior in quality as to be wholly unfit for conversion into an article of commerce.

Dr. T. E. Dempster, of the Indian Medical Service, in an interesting paper which he communicated to the Agri-Horticultural Society of Calcutta (see Journal, vol. ix., pp. 190-201) stated his opinion that the female insect agreed in all essential characteristics with the description given by Cuvier of the true Mexican *Coccus cacti*. The size, however, was smaller. It was distinguished from the female *kermes* by preserving in its advanced stage the distinct form of an insect and never becoming a berry or gall. The Indian *coccus*, according to Dr. Dempster, is found only on the common cactus or prickly pear, and is surrounded by a quantity of fine cottony matter, into which the female deposits her eggs. It was pronounced beyond all doubt to be a true *Coccus cacti*. After several experiments, Dr. Dempster formed his opinion that the coloring matter of the *coccus* found about Loodhiana in the Punjab was "equal in quality to that of the Mexican cochineal."

Attempts were made to cultivate the cochineal in the Government Botanical Gardens, Calcutta, where a brood of the Mexican insect was placed on a large field of the cactus plants, and also in the Agri-Horticultural Society's Gardens. But, in both cases, the experiment was abandoned for no reason that can now be ascertained. Dr. J. McClelland remarked of the color produced by Dr. Dempster from the Indian insect, that nothing could be "finer or more beautiful."

As the cactus grows wild in most parts of India, we do not see why the manufacture of the cochineal should not become a local industry, which must become quickly remunerative wherever both the insect and the cactus, on which it feeds, are found to be indigenous or susceptible of easy cultivation.—*Idem*, p. 155.

TUSSER SILK.

(*Continued from page* 192.)

From enquiries made in 1873 by the Bengal Government, much further information regarding Tusser was then elicited. In the Burdwan division, it appeared that the raw tusser silk was actually produced only in Midnapore and Bancoorah, and to a very trifling extent in Howrah, where the small quantity produced is converted into fishing lines. The silk is woven in Burdwan and Beerbhoom, though the cocoons for the first named district are procured from Chota Nagpore and Keonghur, and for the second named district from the jungles of Sonthalia. In the Hooghly district, where no silk is manufactured, the insect is occasionally found in a wild state.

Tusser silk cocoons are collected from the jungle in Bancoorah and Midnapore—a certain portion of them being kept for seed in Bancoorah only. The cocoons are hung up on thin dry twigs in the houses of the people who collect them. After a time the moth issues forth; the male flies away, while the female remains and is put away at night on the leaves of the *sal* and *asan* trees, where the male impregnates her. The next day, the female moth is taken back to the house, where, in a very short time, she lays her eggs on *sal* or *asan* leaves spread down either in earthen pots or in small covered baskets. When the eggs are hatched the caterpillars are placed on the leaves of the same trees and carefully watched and tended. Sometimes the caterpillars are daily carried backwards and forwards to be fed in the jungle; and in other cases the worms are allowed to remain altogether on the trees in enclosed clearings within the jungle. In every case they are carefully watched. It is probable that wherever the worms are reared, the moths lay eggs in captivity. It does not appear that eggs are ever collected from the jungle in Bancoorah. In Midnapore the eggs are preserved by the people and tended till they become worms, when

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they are released among the trees upon which they feed. To collect cocoons is a task of far greater ease than to collect eggs in the jungles. Wherever the worms may have been reared, the moths must have previously laid the eggs in captivity.

The eggs of moths, obtained from wild cocoons, even when laid in captivity, are considered to be undoubtedly fruitful, so also are the eggs of the moths that have altogether been bred in captivity, that is to say when the moths have been hatched as worms and have spun their cocoons in the captive state. These moths are said to yield three outturns of cocoons in a year. Eggs produced in captivity from the moths of the first two outturns are fruitful; but the moths of the third outturn do not lay eggs if kept under restraint. It is thus apparent that the attempt to entirely domesticate the tusser silk worm will be attended with some difficulty, although the failure of the third outturn of moths to produce eggs may, of course, be attributable to the want of proper treatment. The cocoons, however, which are spun and woven into cloth in the Beerbhoom district, are said to be obtained from the Sonthal pergunnahs, "where they are produced under a regular system of breeding. The cocoons are *for the most part produced from eggs laid and hatched by moths in a state of captivity.*" It is probable that the breed of moths is renewed from the jungle, where females born in captivity are put out to be impregnated by wild males. Besides the particular trees mentioned before, to which it is supposed to be partial, the tusser-worm feeds on a very considerable variety of other trees.

No satisfactory estimate can be formed of the quantity of cocoons annually collected in the several districts of the Burdwan division. In Bancoorah, the quantity collected is considerable, as the cocoons are found in large numbers nearly throughout the whole district. The industry is probably more limited in Midnapore, though even there it is said by competent local authority to be deserving of more consideration. In the Midnapore district it is the custom to pay the Zemindar eight annas or twelve annas per head for the right to collect; while cocoons may be collected in the jungles of the Bancoorah district free of any payment whatever. In the Bancoorah district "those enclosures where the tusser production is specially watched," are estimated to comprise an area of about a thousand *beegahs*. It is not apparent whether any systematic cultivation of the worm on an extensive scale is carried on in any other district of the Burdwan division. Although the Sonthals appear to be chiefly engaged in this industry, other low castes also employ themselves in collecting cocoons. The people who collect the cocoons, also rear the tusser-worms. Women are even now, as in the time of Dr. Buchanan, rigidly excluded from taking any part either in collecting or rearing. In the Bancoorah district, as in Bhaugulpore, the process of rearing the silkworm is attended with some curious superstitious observances. The cultivators are prohibited from touching fish or flesh and from the company of their wives from the time the eggs are laid till the cocoons are formed. During the same period they cannot touch the trees without previously purifying themselves by a bath. No pregnant woman is allowed to approach either the worms or the eggs. In some places, the silk, wound off from the cocoons, is sold to the weavers at from six to eight tolas for the rupee. In other places, the weavers buy the cocoons from the rearers, wind off the silk and weave it into cloth for sale. A tree, when cultivated, is said to have yielded 160 cocoons annually.

The cocoons are boiled for about two hours in water mixed with ashes. The outer coating then being removed, four or five cocoons are placed in a pot of water and the silk from them is wound off at once round a rude instrument called a *láthi* or reel. In Burdwan one thousand to twelve hundred cocoons yield a seer of the best tusser silk, which is valued at from Rupees 8 to 10. In Beerbhoom it takes one and a quarter seer (of 60 tolas) to weave a piece of tusser silk ten yards long, which, if of the best quality, would realise a price of twelve rupees. Here, three kinds of cocoons are brought for sale; and the quantity required for a piece of cloth is produced from the following number of cocoons according to their different kinds:—

	Cocoons.
Northern	1,280.
Western	960.
Southern	800.

Although raw tusser does not appear to be actually produced in any part of the Burdwan district, yet tusser cloth is manufactured there to a considerable extent at Sonamookhee, Patroshair, Mancoor and Bagtikoree. At the first three places a brisk trade, it is said, was formerly carried on with merchants from the upper provinces, chiefly in *kootni* cloth, which is manufactured from silk, tusser and cotton. Although the peculiar demand for *kootni* cloth has been interrupted by the competition of European stuffs it is believed that the demand for all other sorts of tusser fabrics has largely increased.—*Idem*, p. 158.

(*To be continued.*)

CINCHONA GARDENS IN DARJEELING.

The gardens at Poomong in the Darjeeling Hills measure some 2,000 acres, of which about 1,800 acres are under cinchona; mostly red bark. The estate is freehold, and formerly

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much larger, but the proprietors sold large areas to tea planters; and the Gielle Tea Company and the Teesta Valley Tea Association and the Jinglam Tea estates have been formed on the spare lands of the Darjeeling Cinchona Association. The present owners of this large cinchona garden, Major General Angus and Mr. Lloyd, have spent a large amount of money on the estate, which was commenced some fourteen years ago, and up to date have received no return. The Government has larger cinchona gardens alongside, and may be said to have swamped private enterprise. Any way we learn that the Superintendent of the garden has received orders to cut down the trees and send the bark to the London market. The trees are to be destroyed so as to get the bark from the roots, said to be rich in alkaloids; and the land is then to be put up in small lots for public sale among the tea planters. In this way the owners expect to get back the Rupees 325,000 they have spent; though they will never see the interest of the money they have been spending all these years. It seems a pity to destroy what has cost so much time and money. One would have thought that these gardens, which had been made far cheaper than any others in India, and were a great success, would have paid well: but it seems that cinchona is not a paying speculation.—*Darjeeling News.*

We understand that Darjeeling Cinchona is now being practically tested in our General Hospital.—ED. R. R.

SIR SALAR JUNG.

THE career of a native statesman in India does not attract the attention of the multitude at home, unless his name happens to be associated with some Imperial measure, in which case he is seldom favourably mentioned. As long as he is engaged in the Government of some Native State, improving its condition, directing its internal economy, and regulating its finances, he is only known to the Indian Government and its servants, and he is generally all the better for his obscurity. But from the time that Poorneah won the admiration of one of the ablest of our own statesmen down to the present moment, the Native States of Hindostan have rarely failed to produce administrators of marked ability. The visit of the Prince of Wales has produced many results which were not foreseen by the most sagacious observers at home or abroad. It is likely to leave an indelible mark on the history of the relations between England and India. Had that tour never been undertaken Sir Salar Jung would, in all probability, have come to England; but he would have appeared among us in different, and, in all likelihood, in less agreeable circumstances. Eminent as his services have been, and remarkable as his career has been, there are many thousands who ask, "Who is Sir Salar Jung?" And there are many thousands who have never heard of his name. It was a revelation to millions, indeed, to hear that there were still Native States in India with Courts, Ministers, and Armies of their own. We fear that there are some, even among the educated classes, who would be puzzled to give a very definite account of the Deccan, or to describe the territories of the Nizam, and the nature and relations of the State and of its ruler with the British Government. Had the Deccan been involved in the troubles of 1857-8, as Gwalior and Indore were, we should, no doubt, have been acquainted with the particulars, but the services which were rendered to the British Government at that eventful period were of the utmost value and magnitude, although they, fortunately, did not need to be written in characters of blood. The Deccan extends over nearly 100,000 square miles, and is peopled by 10,000,000 inhabitants, of whom the vast majority—probably nine in ten—are Hindoos. The soil is generally good and produces cotton in abundance. Coal and iron mines have been discovered, and the great rivers Kistna, Tombudra, and Godavery drain the vast plateau which forms the bulk of the land and open it to the Eastern and Western Oceans. The first Nizam established friendly relations with the English Governor of Fort St. David in 1747, which were generally maintained in the wars with the French and their allies, and, although for a time the ability and genius of Bussy secured the ascendancy of his council and influence at Hyderabad, the troops and resources of the Nizam were placed at our disposal in the campaign against Tippoo in 1791, and in the struggle with the Mahrattas, and the alliance has continued to the present day. In 1853 Sir Salar Jung was appointed to succeed his uncle Seraj ool Moolk, as Dewan to Naseer-ool-Dowlah, who had just been forced by Lord Dalhousie to assign to the superintendence of the British certain rich districts to secure the payment of debts alleged to be due for the pay of the Contingent which was kept up in accordance with the Treaty by the Deccan. He was only 19 years of age, and the condition of the State was one which might have appalled the boldest and most experienced of statesmen.

There was no money in the Treasury—the system of taxation was wasteful and unproductive. Although the Residents at the Court of Hyderabad had been for many years possessed of paramount power, they applied their energies to the sole object of securing British interests, and did not interfere in the internal affairs of the State with a view to their improvement. In fact, as long as the enormously expensive Contingent was paid, they cared little for the manner in which the money was raised. Armed bands, miscalled soldiery, carried terror and dismay through the country, and created disturbances and riots in the towns at their plea-

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sure. Hyderabad was a hot-bed of turbulent fanaticism. Arab mercenaries and Rohillas, ever ready for mischief, paralyzed the arm of law and order, blighted trade and commerce, and threatened at any moment to require the attention of the Governor-General, at that moment Lord Dalhousie, whose methods in such cases were terribly earnest. Salar Jung began his work by refusing to draw more than half the salary of his office, and his example was followed by the other servants of the State. He put an end to the system of farming the revenues; he discouraged the immigration of Arabs and Rohillas, and set to work to strengthen the hands of the police, and to obtain some degree of security for property and life. But while he was engaged in this Herculean task there came upon him a trial, the tension and force of which can never be understood by a European and a Christian. He was a Mahomedan, and he served a Mahomedan State. The Power which had destroyed the rule of Mahomedan and Hindoo alike was in the utmost peril. The Mutiny and Rebellion had spread over India, and the Governor of Bombay probably told no more than the truth when he telegraphed to the Resident at Hyderabad—"If the Nizam goes all is lost." But the Nizam did not go. Salar Jung, surrounded by armed crowds, who threatened and reviled him, held fast to the British Government. He held the control with a masterly hand, arrested and delivered over to punishment the rioters who attacked the Residency, and inspired the Resident with such a conviction of his ascendancy and fidelity that he ordered the Hyderabad Contingent to join the British forces, with whom it rendered the most signal services. It would be foolish to pretend that in his efforts he had the sympathy of the Mahomedan populace, and that he did not encounter opposition and enmity. His merit is that he rose superior to the prejudices and passions of his co-religionists and countrymen, and that at the loss of his own popularity, and at the risk of a violent death, which more than once well-nigh befell him, he resolved to stand by the Power, even when it seemed at its death gasp, which had given some sort of peace to Hindostan and promised to guarantee its future prosperity and advancement in the ways of modern civilization.

When the rebellion was put down Salar Jung set himself to work at the rest of his self-allotted task. Associated with his co-Regent, the Ameer-el-Kabeer, the very able man who jointly with him is charged with the direction of affairs during the non-age of the boy Nizam, he has developed in the Deccan such enterprise and secured such a measure of peace and progress as have never been witnessed in India since the golden days, and the model rulers of whom the poets and historians tell such marvellous, if not apocryphal stories. Roads have been made or restored, tanks built, wells dug, irrigation works—matters of the first necessity—renewed or created, railways made and planned; an efficient police gradually introduced and extended, schools founded, education fostered, the Arab Chiefs restrained or converted to the cause of order, the irregular soldiery suppressed, the Rohillas disbanded, and Hyderabad so tranquillized that the members of the Prince's suite who visited it were treated with the utmost civility. It may possibly be that they could not detect much pleasure and friendliness in the glances which they encountered. But we should remember that an Egyptian officer charged with the superintendence of certain work on board one of the *Khedive's* ships in the Thames, who took up his abode at Limehouse, found it necessary after a time to lay aside his fez and put on a hat, in order to avoid the jeers and occasionally the more material proofs of dislike of the Christians of that religious district; so that we need not be surprised if the same sort of illiberality existed at Hyderabad. The Indian Government, to mark its sense of the services of Salar Jung created him Grand Cross of the Star of India, and restored to the Nizam the Reichoar Doab and Dharaseo. Sir Salar Jung is of princely rank by descent, and possessed of large estates, but in his tastes he is as simple and unostentatious as he is regal in his hospitalities and charities. He speaks and writes English with ease and elegance, and his manners are so engaging that an English official, who was very much opposed to claims which Sir Salar Jung was urging on behalf of the Nizam against the Government, said that "he thought Englishmen of influence and rank should not be encouraged to go to Hyderabad, as Sir Salar Jung was sure to make converts of them." The impression produced by the Nawab on strangers is certainly very agreeable, and it is not effaced by further intercourse. In the painful discussion which arose in reference to the presence of the Nizam, who is a very sickly boy, at the Prince of Wales' Durbar at Bombay, he never lost his dignity and temper when subjected to very strong insinuations, and he certainly won an easy victory over clumsy opponents in the diplomatic controversy as to the Nizam's health and ability to visit Bombay. The splendour of the deputation which he headed evinced his desire to do honour to the Heir Apparent and to pay respect to the Crown, and both at Bombay and Calcutta he was treated with marked distinction by the Prince of Wales, who was aware of his services and was much interested in his conversation. The Duke of Sutherland, who went to Hyderabad, was much struck by the practical sense of the Minister, who will soon be his guest, and it may be taken for granted that no more remarkable personage has visited this country for many years from countries outside Europe than Sir Salar Jung. —*Times*, 24th *May* 1876.

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